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EDITORIAL NOTES.

Administration and Results under War Conditions.

THE administration of gas undertakings, it is safe to say, has never been put to greater strain and test than in these present times. Everything is abnormal; and everything demands, from those who direct, the closest inspection and the most circumspect action. The questions involved in buying and selling alone are a weighty responsibility; and nothing that directors or committees can do can obliterate, though there may be a lightening of, the effects of the unusual conditions. In the case of companies, consumers and stockholders alike have to share the burdens of increased costs—increased in relation to the business done—which are to be found in every place in the accounts of a gas undertaking in these vastly disturbed and critical days. Not only buying and selling, but the matter of the policy best befitting the times is of extreme importance, as bearing on the financial issues of the trading. Any muddled policy in management just now may make the burdens for gas consumers and proprietors immensely heavier. Take the Gas Light and Coke Company (whose accounts are before us for review) with, in magnitude, an incomparable coal-gas producing plant, and an extensive carburetted water-gas plant. Coal is dear; but the lower pithead priced coal contracted for prior to the war has been carbonized during the past half year. Freights have been high. But they have come down somewhat; and the Company are now, through the action of the Board, provided to larger extent with carrying capacity of their own. Coal in the current half year will be dearer; but the cost of bringing it to London will be easier than the average of the past six months. It is to the advantage of the Company that some of the cheaper coal should overlap well into the current half year, when dearer coal will also have to be used. Then oil has been, and is, cheaper under contracts entered into before the war. Examining all these things in their proper relationship, together with the fact of sluggish coal deliveries during the half year, administrative policy suggested that the production of carburetted water gas should be increased and coal gas reduced. But a critical point was how far this should be done, in view of the excellence of the coke market, and the good prices realizable for coke, sulphate of ammonia, and chemical products. With a smaller quantity of coal carbonized, the output of bye-products has naturally been reduced; and in this circumstance, despite good prices, the income from this source has considerably diminished.

For these various reasons, and owing to the abnormal conditions prevailing, the difficulties of the managerial policy for all gas concerns—and to the extreme for the largest Gas Company—have been intense, and the matter of determination highly responsible. Just two or three figures indicate the character of the anxieties for the Directors. Although the coal carbonized last half year amounted to only 736,696 tons, the total quantity received in the six months only reached 780,574 tons, compared with 906,910 tons in the corresponding half of 1914, which half commenced with 265,692 tons in store, as against only 138,839 tons in January last. June, 1914, ended with 232,764 tons in store; June last with only 181,300 tons. Things are now improving in respect of storage. The figures, however, speak of the anxious time of the half year; but, being totals, they do not tell of the days and the weeks when the Directors—especially the Governor (Sir Corbet Woodall), the General Manager (Mr. D. Milne Watson), and the Chief Engineer (Mr. Thomas Goulden) were filled with concern over supplies.

It must be confessed that there is very little utility in comparing the results of the working of the Company in the half year preceding the war with a half year completely under war conditions. But if there is not much utility, there is interest. That the increase of 6d. in the price of gas since the war started is justified is proved by the accounts, by the new coal contracts, by the reduced business owing to public lighting restrictions and general economy, by the fresh demands upon revenue, and by the fact that the reduced business has made very little (if any) impression upon the general expenditure. With the 6d. difference in price, the smaller business of the half year has given (after providing for fixed charges, and putting by £5000 to the redemption fund, as against £15,000 in the first half of 1914) a profit of £395,050, or £75,573 more than in the first half of 1914. But the balance brought into the corresponding half of 1914 was £614,052, as against £384,538 last half year, or a difference of £229,514—there having previously been serious inroads into the carry-forward, with a view to maintaining the price of gas at as low a figure as possible. The total amount available for distribution is therefore £779,588, compared with £933,530 a year ago, or less by £153,942. The proprietors suffer with the consumers by receiving a dividend at the rate per annum of only £4 4s. per cent., or 13s. 4d. per cent. less per annum than preceding the war. For the half year, therefore, the proprietors only divide £343,501, or less by £54,663 than for the six months preceding the war. Although the sum to be carried into the accounts for the current half year (£436,058) is more than was brought into last half year, it is £99,256 less than the balance forward at June last year. The Directors were wise in raising the price of gas sufficiently to prevent (unless unforeseen circumstances arise) a further shrinkage of the protective and equalizing carry-foward.

The advance of price is one point in administrative policy that has found complete warrant in the result. Another is the increased transfer from coal gas to carburetted water gas, which has helped to minimize the effects of the higher cost of materials. The total make of gas in the half year was 14,411,622,000 cubic feet, or a reduction, compared with the June half of 1914, of 1,000,002,000 cubic feet. But the quantity of coal gas made was reduced by 1,992,272,000 cubic feet, so that, in order to counterbalance production with demand, 992,270,000 cubic feet more carburetted water gas were manufactured. The smaller business done and the larger change-over to carburetted water gas resulted in these working figures: Of the total gas made, 9,609,352,000 cubic feet were coal gas, and 4,802,270,000 cubic feet were carburetted water gas. The quantity of coal carbonized was 736,696 tons, compared with 938,104 tons, or a diminution of 201,408 tons. On the other hand, the amount of oil used rose from 8,619,000 gallons in the June half of 1914 to 11,675,747 gallons last half year—an increase of 3,056,747 gallons. But the tonnage of coal used would have been considerably more had not the make of gas per ton ascended to 13,043 cubic feet, as compared with 12,367 cubic feet in the June half of last year. The increase of 676 cubic feet from each of the 736,696 tons of coal carbonized represents a total of no less than 498,006,496 cubic feet. This has a considerable bearing upon the financial outcome; and the carbonizing department deserves credit for having assisted so well in the relief of the situation.

Though the quantity of coal carbonized was 201,408 tons less, the delivered cost of it—£713,214—was only £75,188 lower than in the June half of last year. The expenditure upon oil, however, went up by £20,825 to £101,235, and for coke and breeze by £15,803 to £67,384. The three items for manufacturing materials total to £881,833, as against £920,393—a reduction of £38,560, produced by the smaller business, the higher make per ton of coal, and wise administration. But deducting the receipts for residuals from the bill for manufacturing materials tells another tale. The net cost of materials, instead of showing a reduction, has gone up by £72,059, as compared with the net cost in the June half of 1914, when 1000 million cubic feet more gas were made! The sum received for residuals in the past half year was £439,448, compared with £550,067 in the first half of last year; so that the relative net cost of manu-

facturing materials was £442,385, as against £370,326, and this lower figure with the much larger business. The effect of this is that, whereas the cost of manufacturing materials in the first half of last year was 1s. 2·33d. per 1000 cubic feet of gas made, and only 0·35d. higher last half year (or 1s. 2·68d.), deducting residuals the comparative net costs per 1000 cubic feet were 5·76d. and 7·36d., or 1·6d. higher for last six months. It will have been observed that the difference in the receipts for residuals is £110,619. Coke (of which at June 30, only 11,658 tons were in store, as compared with 114,705 tons twelve months previously) produced £254,980, which was a decline of £56,026; breeze, in yielding £31,512, gave an increase of £8282; tar and tar products by returning £71,093, supplied £30,300 less; and ammoniacal liquor and sulphate of ammonia by producing £81,862, yielded less by £32,576.

The recession in the sales of gas in the December half of 1914 (which included five months of war) was continued in the past six months. But the whole of the December half year did not feel the full force of the lighting restrictions; last half year did. In the second half of 1914, the reduction in consumption was equal to 4·75 per cent. contrasted with the corresponding period of 1913. Last half year the reduction was 4·31 per cent., compared with the half year preceding the war, in which the increase of consumption was equal to 1·88 per cent. In the first half of last year, 14,059,454,000 cubic feet of gas were sold; last half year the sales amounted to 13,453,753,000 cubic feet, or a decline of 605,701,000 cubic feet, of which public lighting accounted for 182,434,000 cubic feet and shop and domestic consumption for 423,267,000 cubic feet. Through the increase of 6d. in price, the smaller private business brought in £143,367 more—viz., £1,805,640, compared with £1,662,273. Public lamps, on the other hand, only yielded £49,103, or £12,577 less. The receipts from residuals have already been dealt with. Including rents receivable and transfer fees, the total income last half year was £2,539,224—being an increase of £21,916. The total expenditure, amounting to £1,909,184, was less than in the first half of 1914 by £69,249. This, of course, was largely brought about by the lower outlay on manufacturing materials, wages, purification, and repair and maintenance of works, the aggregate of which savings is £54,745—the total expenditure under the head of manufacture being £1,239,151. Under distribution, the expenditure was £352,339, or £9665 less. The constituent items show somewhat normal sway-ings up and down; and the figures indicate that the Board have not allowed the extraordinary conditions to interfere with their established policy of a high standard of upkeep and depreciation. Very few other expenditure items are worth note. The employee co-partners suffer in harmony with the ordinary proprietors in respect of their bonus and dividends on their stockholding. For the year (not half year) ending June last, the total bonus charge was £29,953, compared with £45,653 in the June half of 1914. In the past six months, £1050 has been spent in connection with the quinquennial revaluations; bad debts have gone up by about £2000; there is a charge of £7135 for employees on active service, of whom there are about 2200. Reductions are also seen in the entries for workmen's compensation and the Company's contribution under the National Insurance Act. Thus we arrive at the excellent reduction of expenditure of £69,249, which, with the £21,916 increase in the income, gives the £91,165 by which the amount transferred to net revenue account a year ago is raised on this occasion to £630,039.

The half year has been full of strain and anxiety; but there is some satisfaction in believing that we have, balancing one thing against another, now arrived at (if the expression may be used in these times) settled gas circumstances in the midst of the world-wide chaos.

The Scientific-Industrial Renaissance.

A NEW and wideawake England is to be, or it is hoped will be, one result of the terrific and sanguinary war in which we are engaged. It is a sad and self-accusing reflection that it should have required a war that has caused the upheaval of the whole world's affairs to have suggested to this country, and to cause it, to shake off old trammels, and endeavour to make the best use of itself to the end of a greater national fruitfulness and prosperity. Beyond the passing reflection, however, the less the retrospect concerning this matter, the better. The more profitable lines of thought on which to indulge now that the awakening has come are as to how to develop on the great foundation which our natural conditions provide. Some short while since, the then President of the Board of Education, the Right Hon. J. A. Pease, M.P., informed the country of the scheme in embryo for promoting scientific and industrial research, with at the head of it a Committee of the Privy Council and a small Advisory Council constituted of men with some special qualification. Among other things that have dawned upon the country and its political government is that, up to the present, insufficient has been done in the United Kingdom in systematic development by the organized co-operation of the most talented brains—brains competent for the purpose through specialization. Another thing that has had greater comprehension is that no one body can possibly do all that we now appreciate there is to be done; and that there must be devolution of work if there is to be an opulent result. Specialization and the greatest efficiency go together; and the concentration of the brains of a number of picked men upon one particular branch of work—different Committees being engaged on different branches—will carry the nation and industries farther than otherwise would be possible, and produce the richest harvest of effect. The war started with Government departments pursuing the old formularies of peace times; and red-tapeism continued to detrimentally assert itself. Had these conditions continued, they would have had their proper reward in great national disaster. Fortunately, however, intelligence came to the rescue, but only by the impelling force of very perilous circumstances; and Committees were appointed to undertake special organizing service. Offhand, there can be named the High Explosives Committee, the Munitions Department (with District Committees), the War Inventions Board, and the Dyestuffs Committee, from which has issued "British Dyes Limited," with a Scientific Advisory Council. Now there is the Industrial and Scientific Research Committee and Advisory Council. There is the Coal Exports (Regulation) Committee; there have been the Coal Prices Committee, the Coal Mining Organization Committee, and the Parliamentary Coal Committee. Various other Committees have also been appointed, all with prescribed and useful work. These Committees mean greater efficiency, and the promotion of greater national good. If the life of the greater number of them only coincides with the duration of the war, the influence of their work will be felt far beyond it. There ought now to be another Committee in order to relieve the Board of Trade of the duty of seeing that the provisions of the Coal Prices Regulation Act (passed last week) are properly administered.

But the Industrial and Scientific Committee and Advisory Council are the new bodies which claim present notice, and the best wishes of the nation for a prosperous career, because they provide new and permanent, State-aided machinery for the promotion and organization of scientific research, with application to trade and industry, and the results of which research are to be for the national benefit, and not for the exclusive profit of individuals, companies, or industries. Though the need of a scheme of the kind has long been apparent to individual thinkers and to observers of the trend of affairs in this and other countries, and has been spasmodically advocated by such men, there has simply been, by the only effective political powers in such a matter, an appearance of a good-natured respect for the views, while there was a latent feeling that these views had nothing but academical birth, and little that was practical about them. Inaction was the consequence; and all that has been done has been, on the comparatively small scale, through individual initiative. The vicious idea that men of commerce and industry have the monopoly of practical ideas, and that from the scientific mind there is a complete alienation of that which is practical has had too large a sway. But the war has been the means of shattering such a silly notion. Soon after war broke out, our deficiencies were seriously brought home to a country previously largely contented with its own merits; and the aforetime disbelievers were forced to acknowledge that our shortness of various products, and our inability to promptly produce them, were due to the fact that, as a memorandum issued by the new President of the Board of Education (Mr. Arthur Henderson) neatly puts it, abroad—Germany particularly—"science has been "more thoroughly and effectively applied to the solution of "scientific problems bearing on trade and industry, to the "elaboration of economical and improved processes of manu-"facture." Face to face with such a precarious situation leaves this country wholly stranded for argument to prove

that it has hitherto been in the right, and our rivals abroad wrong in their process for securing industrial and commercial advancement, and therefore greater national prosperity. Although loth to take example by our enemies, we should simply be our own chief enemies if we did not make the utmost use of what we realize now that the scales have been so effectively removed from our eyes. The Board of Education, in taking the lead in this matter, have done the correct thing in setting about the immediate organization on proper lines of industrial and scientific research, because to leave this work till hostilities have ceased would be suicidal. Time would be lost, as well as the advance in the work which it is possible to make while the war continues.

We are glad to see that, through their Advisory Council, the Industrial and Scientific Research Committee are proposing to make use of existing institutions (with the Royal Society at the head) in formulating schemes of research work. Most industries have their own central organizations; and no better bodies could submit suggestions as to the proper lines to develop the scientific study of problems affecting particular industries and trades. There has already been some experience in this direction in connection with most industries; and there will no doubt be a great deal of rivalry in trying to convince the Advisory Council that the best interests of the country will be served by pursuing at once the line which each one suggests. All cannot be in the first running; pressing national interests must have the preference. The Advisory Council will consequently have to exercise a very judicial and circumspect control. But there is fair confidence that the claims of the gas and allied industries will not be considered of second-rate importance. The part that the gas industry takes in supplying essentials to the chemical industry, to the works engaged in the provision of dye stuffs and colours, and to the factories employed on the production of munitions of war, and the large part that it takes in preserving coal from crude consumption, thus preserving to the country the valuable products of its carbonization, are not by any means negligible factors in the country's prosperity. On the contrary, they are all essential to the promotion of industry and commerce, and therefore of the national well-being. The Institution of Gas Engineers, the Society of British Gas Industries, as also the chemists and physicists specially identified with the gas industry, could provide a representative Sub-Committee to put before the Advisory Council for Industrial Research a good and comprehensive scheme for research. Proposals for work will not only be acceptable from institutions, but also from individuals. The scheme, in fact, contemplates the broadest field within which to cultivate interest and co-operation, and to mature result; and this is the correct course. It is easy to see that, if the work is conducted on the broadest possible lines, if the objective of national and industrial prosperity is kept in near view, and if the work is not allowed to become dominated by those engaged in pure science, or in work such as is carried on at the National Physical Laboratory (which has not hitherto made any great impression upon our industrial progress), a widespread interest and co-operation will be quickly developed; and, through the existing educational establishments, and the awards of studentships and fellowships, a continuance of the supply of workers competent to undertake scientific research will be assured. That we have most fortunately a supply of men capable of carrying on the work at the present time is due more to individual mental inclination and ambition than to sufficient external encouragement.

In framing the first scheme of work, the Advisory Council will, as previously intimated, have to make a selection of the lines to be taken, and in this they will be guided by the nation's needs, after giving due consideration to the proposals and considerations that will be submitted to them by the various scientific and industrial institutions. But there is another part of their work that will be highly useful. It is a matter to which Mr. Charles Carpenter called special attention in his recent paper [*ante*, pp. 115, 130] before the Society of Chemical Industry—that is, the need for the co-ordination of, and thus economizing, research. It might almost be imagined that, before drafting the Memorandum upon the Industrial Research scheme, the President of the Board of Education had read Mr. Carpenter's paper, for one part of it is crystallized in the paragraph which reads:

> A large part of their [the Advisory Council's] work will be that of examining, selecting, combining, and co-ordinating rather than that of originating. One of their chief functions will be the prevention of overlapping between institutions or individuals engaged in research. They will, on the other hand, be at liberty to initiate proposals, and to institute inquiries preliminary to preparing or eliciting proposals for useful research; and in this way they may help to concentrate on problems requiring solution the interest of all persons concerned in the development of all branches of scientific industry.

The scheme for the work is excellent; the present financial provision for introducing and establishing it is but meagre. Work of this kind, if worth doing at all, is worth doing well. Of course, money will be voted and provided annually. But the first provision of £25,000 does not strike one as handsome; certainly it does not err on the side of extravagance. The country is to-day spending money at the rate of upwards of 1000 million pounds a year, three-fourths of which amount are due to the war. After the war, there will be a great industrial and commercial struggle to rehabilitate the fortunes of the nations; and it will be a case of the supremacy of the fittest. Where will this country stand in that struggle? The £25,000 suggests frugality in the effort to make the country the fittest. Ideas as to sufficient financing will expand with experience of the work to be undertaken; and with the ideas the provision of money. Whatever money can be well and profitably spent in this research work, should be available for the purpose. Under the advice of the Advisory Council (which is composed mainly of eminent scientific men actually engaged in industries dependent upon scientific work), and the Committee of the Privy Council to whom the Advisory Council will be responsible, excellent reproductive spending should certainly be assured.

The composition of the Committee of the Privy Council and of the Advisory Council is set forth in another column. There is only one remark to make upon the constitution of the Council; and it is that care ought to be taken not to pluralize the public appointments of the members. They have their own private work to do; and the principle of *ad hoc* committees should be applied to the public appointments of men in order to realize the greatest efficiency through, as far as possible, concentration of their talents upon the work. Take Professor Meldola. He is on the Advisory Council of "British Dyes Limited," and on the new Industrial Research Committee. There may, however, be compatibility in these two appointments. Professor Bertram Hopkinson is on the War Inventions Board, and on the Industrial Research Committee. Dr. Percy Frankland is not on the Industrial Research Council, but he is on the War Inventions Board and on the Advisory Council of the Dyes Company. It may be these scientists are also on other bodies. Their names are only quoted here for the purpose of example; and there may be, for aught we know to the contrary, other members of the Industrial Research Council who have likewise accepted positions on other public bodies. All honour and power to them; but the country wants the efficiency that comes from entire concentration of effort and specialization.

Coal Price Bill—A Retrospective Clause.

The Coal Price (Limitation) Bill has passed through all stages of both Houses of Parliament; and the Royal Assent has been given to it, so that it now stands part of the law of the land. The House of Lords did not trouble to discuss it at any length, apparently being satisfied, and with good reason, that all there was to be said *pro et con* had been said in the Lower House, and that there was no use further tinkering it about. It has been described as an emergency measure, for application during the war and for a period afterwards; but it will form a useful basis for later discussion as to whether the best interests of the country would not be served by, through statutory control, preventing those unreasonable flights of coal prices that have taken place on the slightest provocation, especially during recent years. These flights have had very serious effects upon a large coal-purchasing industry such as that devoted to gas supply, and to the providing of considerable quantities of raw materials from which products are derived that are essential to the life of other industries.

Some of the pessimists seem to think that the new measure is not going to serve any useful purpose. If it is not, it is a pity that so much time has been spent over it by our legislators. But that is not our view. The measure now provides an impassable bar at the pithead to excessive prices under the extraordinary conditions of the time; and this should be of considerable advantage in the protection of the industries of the country. It should be, for instance, to the gas industry now and during the continuance of the war,

although it means that, during the whole period of conflict, the pithead price of gas coal will remain about uniform at the 1913-14 prices, *plus* the 4s. standard for the "extras" (with a margin) occasioned to coalowners by the war, and the price of gas will consequently in many places continue above pre-war figures. The importance to the gas industry of increases in the cost of coal is seen by the one fact that only 1s. per ton advance means a charge of about 1d. per 1000 cubic feet of gas made; and that 1d. per 1000 cubic feet of gas on the sales by statutory gas undertakings in the United Kingdom in 1912-13 (198,922,469,000 cubic feet) represents £828,843 to be found by the consumers. Multiply this sum by four to equal the 4s. per ton standard excess over 1913-14 coal prices, and the product amounts to no less than £3,315,372! If the total coal consumption of statutory and non-statutory gas undertakings were calculated out at the 4s. per ton increase, it would represent a considerably higher sum.

Various amendments were made during the later stage of the measure in the House of Commons. None of them affect the main parts, but are, generally speaking, insertions to seal-up possible loopholes for escape from the control of the provisions—such, for instance, as a scheming colliery-owner selling indirectly to a customer through a middle buyer, and so evading the Act. The principal alteration made in the measure is the one promised by Mr. Runciman, which will enable those buyers who have made contracts at high prices to come within the operation of the Act—that is to say, in respect of contracts for coal for domestic or household purposes, or for any purpose of local authorities, or for use in the public services of gas, water, and electricity supply carried on "in pursuance of authority given by an Act of Parliament or by an Order confirmed by, or having the effect of an Act." The benefit of the retrospective clause is therefore withheld from non-statutory concerns. The concession only applies to contracts made between April 1 last and up to the commencement of the Act. The obligation rests upon the person or persons who has or have made the contract to give notice in writing, within two months from the passing of the Act, of his or their desire to take advantage of the provision. This will only apply to contract coal delivered after the expiration of three months from the commencement of the Act; and, if the coalowner can show the Board of Trade good cause, the Board have power in individual cases to extend the three months before the Act begins to apply. For the purposes of the Act, too, the contract coal so delivered under this retrospective clause is to be taken as having been sold at the time of delivery. By the clause, the purchaser obtains relief, the coalowner secures a period of grace (during which he may try to fill the stores of the purchaser with the dear coal) before the provision begins to operate, and he may even be able to arrange subsequent deliveries so as to get them to synchronize with the best prices that were obtained at the pithead at corresponding dates in 1913-14. Those purchasers who have already made their contracts must have a care that they give notice within the prescribed period, if they desire to take advantage of the clause; and they must not be so imprudent as to defer reasonable deliveries, and work from stock, so as to secure the lower price. This advantage may be cancelled by a shortage of supply in the winter months. This is really the only change in the measure which directly affects readers who since April 1 have entered into contracts at higher figures than those provided for under the Act. They will find the precise terms of the new provision set out in our "Parliamentary "Intelligence."

Falsification and Fraud.

It is a great satisfaction that it does not fall to our lot to frequently have to report cases of falsification and fraud on the part of the officials of gas undertakings. When on rare occasion we have to do so, it is a matter for the sincerest regret. It is so in connection with the case reported in our "Legal Intelligence" last week and again to-day. Thomas Henry Lamb, for twenty-three years Secretary of the Walton-on-Thames and Weybridge Gas Company, has stood in the dock at the Central Criminal Court alongside a subordinate named George Waters Ross, who was Assistant Secretary and Collector, charged with conspiracy, falsification of books, and robbery of their employers' money—the peculations amounting to several hundred pounds. There is no call upon us to give here greater prominence and emphasis to the details of the case than are supplied by the report of the proceedings. Lamb has stepped from the dock a free man; but Ross has been sentenced to twelve months' imprisonment with hard labour. Though Lamb has been adjudged "Not guilty" of the serious indictments, it is impossible to exonerate him from all blame in the matter; and it must be on his conscience to-day, and ever will be, that, had it not been for his own laxity, and therefore his unfaithfulness, in the discharge of his duties, Ross would not have been given that free and easy succession of opportunity for defrauding his employers in the ingenious manner that he did. Lamb owned up, his Counsel admitted on his behalf, to negligence in checking and supervising the books. This dereliction of duty, and the further unusual act of borrowing money, in connection with Stock Exchange transactions, from, or through, a subordinate such as Ross, made it almost inevitable that the two men, as soon as the defalcations were discovered, would be linked together. However, Lamb has paid the penalty of default and indiscretion by the disgrace of appearing in a criminal dock with the man who is now undergoing the punishment awarded him by the law for his misdeeds.

It was a most complicated case; and the contradictory evidence was such that any Jury would have found it very difficult to have convicted Lamb of the misdoings with which he was charged; but Ross, who had also been in the Company's service a great number of years, stands branded as a thief and a liar. The only redeeming feature of the sordid tale so far as he is concerned is that, though he at first implicated Lamb, he afterwards relented, and testified to the complete innocence of his former superior officer in respect of the frauds. A very unsatisfactory portion of the proceedings was the evidence in regard to the action in the matter of the Fidelity Guarantee Society. Memories seemed to be sadly at fault, and thus at variance, as to what had transpired in connection with the satisfaction by Lamb of the claim of the Society against him, amounting to £500. Lamb explained that he paid the Society this sum as he considered that a moral obligation rested on him owing to his non-detection of the frauds. But naturally the payment of the sum (which there was no obligation for him, being innocent, to pay) was really another link in a chain of circumstances that drew Lamb deeper into this foul mess. The Society's claim was spoken of as a "civil debt;" and Lamb believed he was free from legal prosecution with, in hand, the Society's receipt for the £500 bearing the words "in full "settlement and discharge of all claims under this guaran-"tee." But it was not within the power of the Society to compound a felony, or to give a man acquittal from a criminal charge. The words quoted do not suggest that the Society claimed that power; and the interpretation given to the words by Lamb and those acting with him was—perhaps pardonably—in excess of their literal meaning. The evidence was also contradictory from the three quarters—the Society, Lamb, and the Company—as to the intentions of the Directors of the Company in regard to the prosecution of Lamb. But what is clear is that, whatever was said or believed, the Society had no authority from the Board to give Lamb any assurances as to their action in the event of him satisfying the Society's claim.

The whole case is one of several unpleasant features apart from the more serious ones; and warning stands out from every phase of it.

South Metropolitan Gas Accounts.

The accounts of the South Metropolitan Gas Company came to hand on Saturday as the "JOURNAL" was being "made up" for press—earlier than customary owing to the interruption of the normal week's work by the Bank Holiday. In view of this, our examination of the results of the working must be deferred until next week; but the Directors' report and the statement of accounts are, in the main, reproduced in another part of this issue. The decrease in the consumption of gas (owing to the lighting restrictions) is only 3·73 per cent. as compared with the corresponding period of last year, when an increase of 2·29 per cent. was registered. As the Directors did not look upon a decrease of 4·29 per cent. in the December half of 1914 (with five war months in it) as "disappointing," the smaller percentage reduction over the past six months' trading under war conditions must be regarded, in the circumstances, as satisfactory. The price of gas having been raised to 2s. 10d., the sliding-scale (which is a description of extraordinary suitability to-day) has caused the

dividend to slide-down from the rate of £5 9s. 4d. per cent. per annum to £4 8s. per cent.—a reduction of £1 1s. 4d. The carry forward is £3589; but there was only £1202 brought into the half year. This shows that, in calculating the effect of increasing the price of gas and reducing the dividends, the Directors gauged closely the extent of their probable requirements.

The Price and Shortage of Sulphuric Acid.

Coke-oven owners, like gas-works, are suffering from the high price and shortage of sulphuric acid of the quality best suited for sulphate of ammonia production. This is due to the large requirements of the Government. "Event and Comment" has in our columns called attention to this on previous occasions; and last December he stated that he had heard of cases where, owing to acid being unobtainable, loss of ammonia was actually taking place. This is a serious business for the coke-oven people, who are just as dependable on the good prices of sulphate of ammonia as gas-works for presenting a satisfactory balance-sheet. A writer in the "Iron and Coal Trades Review" now confirms the statement of our own contributor. Alleging that, owing to the high price of sulphuric acid, "many contracts" have either been repudiated or else considerably modified, he goes on to hold out the mournful prospect of sulphate makers having no option but to run their ammonia to waste, if the necessary sulphuric acid does not become immediately available. We hope nothing so deplorable will occur. Alternatives in the way of manufacture are also considered by him. There is the production of ammonium salts; but it is no good discussing the further manufacture of something the existing supply of which is equal to, or actually exceeds, the demand. The same writer raises the question of coke-oven owners making their own sulphuric acid. A similar suggestion relating to gas undertakings was put forward in our editorial columns on Nov. 17 last; and gas undertakings of sufficient size, or a group of smaller gas-works, are in a better position than most coke-oven makers to enter upon sulphuric acid manufacture, owing to the availability of sulphur in the oxide purifiers. It is not usual at coke-oven plants to purify the gas, although with the extension of the adoption of gas-engines for power, this is being done, owing to the deterioration caused by the sulphur in the gas. Gas-engine driving and sulphuric acid requirements may between them cause a large extension of oxide purification of the gas from coke-oven plants.

Gas-Works and Rubber Manufacture.

Under this heading, the "Gas Engineering Correspondent" of "The Times" writes on the "prospects" of the production of artificial rubber by gas-works. But the "prospects" are of the visionary order; and this he confesses. It is not a new subject; but that synthetically produced rubber will ever come into strong competition with the ordinary commercial commodity is, for several reasons, very unlikely. It is pointed out that chemists assign to rubber an empirical formula similar to that of isoprene; and in one of the latest processes (which, though it is improbable it will ever enrich him, is thought to be of interest to the gas engineer) isoprene is the staple product. In distilling coal, small quantities of isoprene result from the combination of carbon and hydrogen, and are to be found in the escaping gases. The separation of the isoprene is effected by benzol, which is distilled at a comparatively low temperature, and is afterwards heated with sodium in the form of threads or sheets, and maintained at atmospheric temperature. A brownish coloured powder, consisting of hydrocarbons of the acetylene series, in combination with the sodium, is then deposited, and, when the action is complete, a gelatinous mass results. On the proper consistency being reached, the sodium compounds are filtered off, the mass is washed with benzol, and the precipitation of the rubber is secured by the aid of alcohol. Sulphur compounds in the benzol present a difficulty, but an appreciable proportion of these could be removed by washing with sulphuric acid. The chief impurity is carbon disulphide, which offers the greatest resistance to ready treatment. So far as this country is concerned "Gas Engineering Correspondent" considers the process is only of academic interest. In working the process, it is evident, close technical supervision would be required. Gas managers are very busy just now developing their businesses on practical and paying lines; and they will not be disposed to go dabbling in a venture, and saddling themselves with a process obviously containing little or no profit for their concerns.

THE DEATH OF MR. EDWARD ALLEN.

Letter of Sympathy from the French Gas Society.

We have received from Mr. Walter T. Dunn the following translation of a kindly letter of sympathy from the Société Technique de l'Industrie du Gaz en France, in the loss sustained by the Institution of Gas Engineers by the death of Mr. Edward Allen. A copy of the reply of Mr. John Young, of Hull, the President of the Institution, is appended.

[Translation.]

Société Technique de l'Industrie du Gaz en France,
94, Rue Saint-Lazare, Paris,
July 23, 1915.

John Young, Esq.,
President of the Institution of Gas Engineers,
39, Victoria Street, Westminster, S.W.

Mr. President and dear Colleague,—The English journals have made known to us the death of Mr. Edward Allen, Engineer of the Liverpool Gas Company, Past-President of the Institution of Gas Engineers, and Honorary Member of the Société Technique de l'Industrie du Gaz en France.

I beg you to accept the assurance of the profound sympathy of our Council in the loss sustained by the Institution of Gas Engineers. The long career of Mr. Edward Allen was spent entirely with the Company he served with so much distinction, and we know how highly he was regarded by all his colleagues—a regard which was eminently justified by his numerous attainments.

Will you transmit to the members of the Institution of Gas Engineers the expression of our condolence, and accept, I beg of you Mr. President and dear colleague, the assurance of my devotion.

(Signed) F. Rouland, President.

The Institution of Gas Engineers,
39, Victoria Street, Westminster, S.W.,
July 28, 1915.

Monsieur F. Rouland,
President de la Société Technique de l'Industrie
du Gaz en France,
94, Rue Saint-Lazare, Paris.

Dear Mr. President and Colleague,—Please accept my sincere thanks for your kind letter of sympathy in the great loss which we have sustained by the death of Mr. Edward Allen. Mr. Allen's sweet personal nature and high attainments endeared him to all who knew him, and the suddenness of his death came as a great shock to all.

Again thanking you for your sympathy, and with kind regards,
Believe me, dear Mr. President and Colleague,
Yours very sincerely,
(Signed) John Young, President.

CITY AND GUILDS EXAMINATIONS PROGRAMME.

The programme for the session 1915-16, a copy of which has been received from the Department of Technology of the City and Guilds of London, contains the usual information with regard to the large number of examinations to be held. So far as concerns those in which readers of the "Journal" are particularly interested, the principal alteration in the present edition of the programme is the revision of the syllabus relating to the examination in "Coal-Tar Distillation and Intermediate Products." The lists of works of reference which candidates are advised to consult have also been revised. The following are the Acting Examiners in the subjects named: "Coal-Tar Distillation and Coal-Tar Products," Mr. W. H. Coleman and Dr. J. C. Cain; "Gas Engineering," Mr. Samuel Glover; "Gas Supply," Mr. Walter Hole; "Gas-Fitting," Mr. Henry Kendrick and Mr. Ralph Halkett; and "Heating and Ventilating Engineering," Mr. A. H. Barker. The date of the examination in "Gas Engineering" is Saturday, April 29; "Gas Supply," Saturday, May 6; and "Gas-Fitting," Monday, May 1.

Particulars are given of the scholarships, exhibitions, and money prizes offered by the City Livery Companies and other bodies. In "Gas Engineering," "Gas Supply," and "Gas-Fitting," the Society of British Gas Industries again offer prizes of £3 3s. and £2 2s. to the first and second candidates respectively at the Final Examination in each subject, provided that they are eligible under one of the rules which is named. The list of persons registered as qualified teachers in technology forms the concluding section of the book.

It may be added that copies of the programme (price 9d. net, postage extra) may be obtained from the Publisher, Mr. John Murray, Albemarle Street, W. The report on the work of the Department of Technology for the preceding session, in which are reprinted the question papers and examiners' reports on the results of the examinations, may be had at the same address and at the same price.

A sum of £10,000 has been presented by Mr. Heath Harrison (of the Harrison Shipping Line) to the Liverpool University, for the endowment of a Chair of Organic Chemistry. Realization of the importance to the country of the application of scientific knowledge to the solution of industrial problems is what has led Mr. Harrison to make this gift.

PERSONAL.

The Corporation of the City of London last week unanimously appointed Mr. ERNEST EDWARD FINCH City Engineer in succession to the late Mr. Frank Sumner. Mr. Finch, who is to receive a salary of £800 a year, has for some years past occupied the position of Chief Assistant in the Engineer's Department.

The retirement of Mr. Higginson from the position of Secretary and Manager of the Broadstairs Gas Company was referred to in last week's issue. We have since learnt that Mr. W. DALLAS, the late Chief Clerk, has been appointed Secretary and Manager of the Company, and Mr. E. JAMES has been, tentatively, appointed Works Manager.

Out of the 43 applicants for the position recently advertised in the "JOURNAL" in connection with the Abertillery Urban District Council Gas Department, Mr. ERNEST D. WOOTTEN has been selected as Manager. He was formerly Assistant to the Engineer of the Burslem Corporation Gas-Works, Stoke-on-Trent, and was latterly Manager of the Cockermouth Urban District Council Gas-Works.

The Directors of the Salisbury Gas and Coke Company have appointed Mr. WILLIAM FIELDEN, late Manager of the Staines and Egham Gas Company (now incorporated with the Brentford Gas Company), to fill the vacancy created by the retirement of Mr. N. H. Humphrys. Previously he was on the staff of Mr. R. W. Edwards, of the Aldershot Gas, Water and District Lighting Company, going there from the Todmorden Gas-Works. Mr. Fielden takes office at Salisbury on Oct. 1.

OBITUARY.

Mr. S. H. KIMBELL, who has been Secretary of the Wellingborough Gaslight Company, Limited, since September, 1873, died on Monday last week, in his 71st year, after an illness of about two years' duration.

Mr. WILLIAM SHANKLAND, whose death is announced, was appointed a Director of the Girvan Gas Company as long ago as 1866, and was made Chairman about ten years since. He was one of the leading business men of the town.

The death has occurred of Mr. THOMAS GASS, aged 68, who was for many years Manager of the Ecclefechan Gas-Works, of which he later became proprietor. He continued to occupy the position of Manager until seven or eight years ago, when he retired.

The "Journal für Gasbeleuchtung" for July 17 reported the death, on the western battle front, of Herr MAX PASCHASIUS, the Engineer of the gas, water, and electricity works of the Corporation of Ratibor, in Upper Silesia. Deceased, who was a First Lieutenant, in charge of a company, had been Assistant at the Osnabrück gas, water, and electricity works prior to his appointment at Ratibor.

Engineership of the Liverpool Gas Company.

Consequent upon the death of Mr. Edward Allen, the Directors of the Liverpool Gas Company have decided to appoint shortly a Sub-Committee, to recommend certain re-arrangements of the duties connected with the several departments of the Company, after which it is their intention to appoint Mr. R. E. Gibson (who was Assistant-Engineer under Mr. Allen) to the vacant position of Engineer. Meanwhile, the Directors have authorized Mr. Gibson to use the title of Engineer.

American Prize for a Fire-Place Gas-Heater.

It was stated in the "JOURNAL" in August of last year [p. 477] that a Joint Committee had been formed by the American Gas Institute and the National Commercial Gas Association (of America), to deal with the subject of fire-place heaters, and that they were offering a prize of $150 for the best design of one to burn gas. In announcing the offer, the Committee said: "There are several types of heaters on the market which are fairly satisfactory from the standpoint of heat production, but do not meet the requirements from the standpoint of appearance. The Committee want a design of heater that may be placed in the open fire-place of the library, living-room, or dining-room of an artistically furnished dwelling, which will be appropriate for the purpose, and artistically consistent with the furnishings of the room. The appearance when unlighted is of equal importance with the appearance when lighted; and in awarding the prize, these two features will be given equal prominence." We now learn from the Committee that judgment in the competition on fire-place gas-heater design has been given in favour of Messrs. R. S. Stokvis and Zonen, Limited, of Rotterdam. The judges were three Philadelphia architects; and there were seventeen designs entering into the competition. Further details regarding the winning design will be submitted with the report the Committee will make to the American Gas Institute and the National Commercial Gas Association.

ELECTRICITY SUPPLY MEMORANDA.

SOME of the men whose calling is electrical are fond of variety and the extremes in variety. If they desire to show that 2 and 2 make 4, or that the electric cooking load (where there is any) does not overlap the lighting load, or that, while electricity is charged at ½d. per unit for cooking for two or three comparatively short spaces of the day, 6d. per unit is a fair charge for lighting purposes, they can to that end cover sheets of foolscap with formulæ and hieroglyphics, and the man in the corporation committee room is not, as a result, one whit the wiser. At the other extreme, if an electrical journalist wishes to criticize anything a gas man has said, he can please his electrical readers with the most lightsome superficiality and triviality. From this sort of thing certain of the electrical "technical" journals have now degenerated by introducing into their publications a comic section. Awards in the way of phantom hot-plates are also another brilliant development for a "technical" paper. We commend to the consideration of the "Electrician" the award of a hot plate to the writer of "Gossip" in "Electrical Industries." He deserves it for the distinguished superficiality with which he has commented upon the articles of Mr. H. C. Widlake that have been appearing in our columns on the subject of "Power Production: The '£ s. d.' of the Question." Our contributor would no doubt be overwhelmed with gratification at the entertainment with which the gossiper of "Electrical Industries" would like people to believe he has been provided, were it not that the form of the criticism must show him that the critic has found the groundwork of the article too difficult to deal with, and so has contented himself with scratching the surface of the hard ground like a hen in search of grubs. The critic credits Mr. Widlake with "commendable wisdom," which is a virtue of which electrical competitors usually fight shy. The critic tells his readers that Mr. Widlake reports that the progress made by the electric-motor in the industrial world is due to the "lofty disdain" entertained by gas engineers for electric prime movers, which is not at all what our contributor did. What he was impressing upon gas engineers was that they had "absolutely played into the hands of our electrical opponents by indulging in the foolish policy of underrating a powerful enemy," and had looked with "lofty disdain upon a machine whose applicability for certain purposes cannot be denied by any intelligent person." This does not suggest that progress would not have been made by the electric-motor if the "lofty disdain" had been non-existent.

Superficiality.

Cost Basis and the Load.

The only material piece of criticism by "Electrical Industries" is this; and it does not go far towards destroying Mr. Widlake's argument and comparison:

> In reducing his arguments to a cash level, Mr. Widlake has prepared two of the most brilliant comparative tables it is possible to imagine. Comparing the yearly working costs of gas-engines and electric-motors, he takes the price of gas to be 1s. 4d. per 1000 feet and the price of electricity to be 1½d. per unit (an eminently satisfactory basis!); but on top of this he assumes the gas-engine and the motor to put in 2800 working hours per annum "at normal load." The absurdity of such a supposition is, of course, self-evident.

Regarding the costs, the critic knows that the writer of the articles in question hails from Plymouth; and the costs he took were the actual ones obtaining in that district prior to the commencement of the war. As to the assumption of a normal load, some basis had to be taken; and both gas-engine and electric-motor were similarly dealt with, notwithstanding that the efficiency of the electric-motor decreases with load. Will the critic show what other standard basis for ascertaining comparative data could be taken? There must be an equality of fundamental conditions. Surely the critic is not foolish enough to think that our contributor is unacquainted with the fact that no engine or motor in a factory works at normal load "week in, week out, from morn to night;" and yet his flimsy criticism seems to suggest that he does.

The "Messy" Lubricant.

The critic, from the mass of data and argument, selects for his main "offensive," as though it was the strongest point presented, the question of the charge for lubricating oil! Marvellous discrimination! He says:

> This running charge is set forth in the following terms: "Lubricating oil at 1s. 6d. per gallon—5s. 7½d." So that, in order to operate a 1½ horse-power electric motor for twelve months, the wretched electric power consumer is to be forced to purchase and make away with the best part of 4 gallons of lubricating oil. But where he is to pour this huge volume of messy fluid our author, with great carelessness as it seems to us, fails to mention.

What is the value of such criticism as this? The oil allotted to the electric-motor was very little, and made a very modest difference to the charges. On the 47 B.H.P. machine, this would run out at under 0·002d. per B.H.P. hour. The running costs of the motor, neglecting oil, would be 1·3d. *minus* 0·002d., or 1·298d. per B.H.P. What a stupendous matter for electrical wisdom to lay hold of! If the electrical critic suggests using less oil than this, his ideas on plant cleanliness leave much to be desired, as it is the usual

thing, recommended even by the manufacturers, that the wells should be flushed-out and refilled every time the motor is cleaned. The enormous amount of 4 gallons of waste oils of which the user of the 1½ B.H.P. motor would have to dispose is truly an appalling problem, more particularly as it would come on his hands in 52 instalments of about 0·6 pint each, providing he gives his motors a weekly clean. May we suggest, in view of the hugeness of this quantity, and the enormous task of handling it, that the embarrassed user might, provided he has no oil-cans which require replenishing, enter into a contract for refining it, when the magnitude of the amount would probably get him very favourable terms on an annual contract. "Electrical Industries" alludes to the opinion of the Metropolitan Spring Mattress Company as to the cost of gas-engines and electric-motors at their works. Need we say that, as our electrical contemporary refers to this case with considerable gusto, the opinion is favourable to electric-motors. We should like "Electrical Industries" to publish a detailed table of the comparative costs at the works in question, with information as to types, age, &c., of the machines. We ask for these because there are many good illustrations of gas power having completely beaten electric power.

The Motor, the Purpose, and the Charge.

The decision in the Alloa Theatre case [referred to in the "Memoranda" last week] has set the electricians hopping about the question of whether or not the correct policy is to charge the energy supplied to motor generators under the power or the lighting tariff. As gas suppliers (as stated last week), we should prefer to see electricians charging the lighting rate for the purpose; if we were electricity suppliers, as a matter of practical and sane policy, the power tariff would win. Electrical men would rather cling to charging at the lighting rate; but prudence holds up a warning finger. Mr. A. J. Abraham, of Aberdare, has written to the "Electrical Times" on the subject; and he takes the practical view. He rightly asserts that no electrical engineer, tempt he never so wisely, is going to throw out private gas or oil driven plants by adopting the lighting rate. He gives those municipal authorities a nasty facer who urge that the lighting rate should be charged when he says that certain corporations will supply other motors which come on to main peak at fixed power rates, and yet directly it is a motor which drives a dynamo they try to make out that it is not power because it is driving a dynamo, "so that the engines in our power stations are not power either." Then he gets in another blow when, having stated that he would gladly supply a motor at power rates which drives a gas-lighting plant, he says he hopes before the winter to supply the Aberdare Gas Company with a lot of power, to the mutual advantage of both undertakings. "I did not say to the Gas Company: 'I cannot supply you with power at power rates because you want it to make gas for lighting, and therefore it is not power.' I wonder whether the Alloa Corporation would have said this." Referring to this letter, "Meteor" remarks that the present conditions in the fuel, labour, and materials markets, has put tariffs into the melting-point. But he is faint-hearted over the prospect of a satisfactory one emerging. He does not deal with the practical issues raised by Mr. Abraham. He is, however, sadly afraid of the logical consequences of supplying cinematograph owners with energy at lighting rates for motor generators, because he foresees the proprietors of factories and large shops claiming the same thing. The consequences are admittedly far-reaching. But the question is, Are electricity suppliers going to take this business or renounce it by charging-up at lighting rates? Naturally, we should prefer to see them adopt the latter course. A gas-engine can be connected-up to the dynamo just as well as a motor; and, if the gas supplier is not prepared to furnish gas for the engine at power rates, well a gas-producer plant can always be installed. It will not be the arguments of "Meteor" which will settle the question of the correct charge, but the more cogent argument that can be administered by the user, who has a variety of methods at command for bringing the electricity supplier to reason. However, we sincerely hope that all electricity suppliers will stick resolutely to the lighting rates for the supply of motor-generator sets. They ought to for the sake of doing a good turn to the gas industry, and in order to merit its blessing.

Cheap Work in the Villa.

The suppliers of electricity would like other people to work for next-to-nothing in order to produce benefit for their electricity undertakings. The manufacturers of electricity appliances are charged with putting prohibitive prices upon their wares; and the electricity suppliers expect labour, materials, profit, and all else to be squeezed into a very emaciated-looking selling price. The contractors are also expected to do the wiring of premises at prices which will not keep some of them out of the bankruptcy courts. If anyone is to blame for the cheap and nasty electrical wiring and goods introduced into the houses of consumers, it is the electricity supplier. He clamours for cheapness on the one hand; he reaps a bountiful harvest of complaints on the other. So much has this been so in connection with the few electric-cookers fixed, that electrical engineers have seen the wisdom of switching-off cheapness on to something more substantial, and therefore more costly. Cheapness in electrical work has been of the greatest possible use to the gas industry, while it was intended to be the reverse. The writer of "Installation Topics" in the "Electrical Times" complains of the large amount of villa property left in the hands of the gas supplier. There is nothing for surprise in this. Occupiers of villa property are not people of unlimited means; and they like to see economy, efficiency, and a big range of service all brought into one moderate account. Villa residents were not divorced from gas prior to the war; and they are hardly likely to be captured to any extent during the war and for some years to come—if ever. Their capacity for increasing expenditure has been reduced by the war; and the political and financial prophets tell us that the burdens of the great upheaval are going to be felt by the community for many years to come. The surprise of "Installation Topics" that so small a proportion of villa property is wired for electricity supply will have to continue. He uses a town down south as an example of the little that has been done for electricity among villa property. From what he says, the electricity department does not canvass the smaller households; and the contractors simply wait in the true Micawber spirit for something to turn up. When the contractors do get an inquiry, they quote what are considered to be exorbitant figures. For the wiring of a six-roomed house, £10 was asked, exclusive of fittings, lamps, and switches; and the householder could not afford this outlay. The writer of "Installation Topics" is of opinion that the work with surface wiring could have been done for £4 or £5, or a complete installation, including plain fittings, lamps, and switches, could have been put in for about £7. We have examined electric-lighting installations that have cost about £7 complete. Heaven forbid we should ever have anything to do with similar shoddy work for villa residences. We know instances of a gradually dropping-off of electricity consumption, and a return to gas, where such installations have been made. Rapid deterioration breeds neglect and dissatisfaction. "Installation Topics" regrets that "contractors should quote prices that they must know quite well are beyond the limits of the potential consumer." Electrical contractors must live now that they have been created. But electricity suppliers devoutly wish the contractors had never had any part in the great mundane scheme; and we believe with the fullest confidence that the former would not mourn if they awoke one morning to the intelligence that the latter had, by some benevolent dispensation, ceased to have part or place in the electrical world's affairs.

Pope's Patent.

The Osram Lamp Works, Limited, have had such a long chain of successes in connection with their infringement litigation that it must have come as a sad blow to them to hear Mr. Justice Joyce give judgment in favour of Pope's Electric Lamp Company, Limited, also in an action for infringement. The case was submitted to his Lordship in elaborate form. The patent that was being defended by the Pope Company was not merely for manufacturing a tungsten filament, but for the specified method or process for making the filaments; and his Lordship was convinced that the process was so different from what was particularized in the plaintiffs' specification that he declared there was no infringement. Costs were granted on the higher scale. The matter is of such importance to the Osram Company that it has been intimated that an appeal to the House of Lords is to be set down this side of the vacation.

"Half Watts" in New York Streets.

It is stated by the "Electrical World" that, during the last six months, upwards of 10,000 arc lamps have been replaced by an equal number of "half-watts" of various sizes from 300 to 1000 watts. The size of lamp installed was determined by the illumination demands of the immediate vicinity: Large squares at intersecting streets and junction points, 750-watt lamps; important thoroughfares, 500-watt lamps; cross-town thoroughfares, tree-lined, or parked avenues, and streets and avenues with car-lines, 400-watt lamps; mercantile and wholesale districts, residence streets, and small parks, 300-watt lamps. Approximately 600 multiple-arc lamps in use on the bridges connecting the several boroughs have also been replaced by 300-watt gas-filled tungsten lamps.

Air Raids and Generating Stations.

The "Electrical Review" has been congratulating the electricity supply industry upon the fact that, in the air raids that have so far been made, electricity generating stations have escaped any damage; but our contemporary admits that such stations are not bomb-proof. It also acknowledges that one high explosive bomb successfully placed might wreck an entire station, and do such injury as to prevent the supply of electricity for a very long time. It considerately omits to mention that the gas industry is supplying a large quantity of substances required for making high explosive shells and bombs, and is thus helping to save the country from the certain defeat there would be if these forms of destructive instrument were not available to this country, while being so to enemy countries. Supposing, however, a bomb or shell hits an electricity station in its vital parts and incapacitates it, our contemporary inquires whether the failure to continue supplying in such circumstances would expose to any liability the company or the local authority supplying electricity. From its examination of the position, the "Review" arrives at the sapient conclusion that, although the Legislature never contemplated damage from hostile aircraft, there is ample protection in the proviso to section 30 of the Electric Lighting Clauses Act, 1899.

THE GAS LIGHT AND COKE COMPANY.

Half-Yearly Report.

THE following is the report of the Directors of the Gas Light and Coke Company for the half year ended the 30th of June, which, with the accounts (some particulars from which are given below), will be presented at the ordinary meeting on Friday.

The accounts for the past half year show that, after providing for fixed charges and setting aside £5000 towards the redemption fund, there remains a profit balance of £395,050 13s. 11d. The amount brought forward from the previous half year being £384,538 3s. 10d., there is an available balance of £779,588 17s. 9d., out of which the Directors recommend the payment of a dividend on the ordinary stock at the rate of £4 4s. per cent. per annum, which will absorb £343,501 6s. 1d.

The sum to be carried forward to the credit of the current half year is £436,058 11s. 8d.

The sales of gas for the half year show a decrease of 4·31 per cent. on the quantity sold during the corresponding period of 1914. This result was brought about by the continued official restriction of lighting in the Company's area.

Prices of coal and oil having steadily advanced during the half year, the Directors were compelled again to raise the price of gas (from 2s. 8d. to 3s. per 1000 cubic feet), involving a statutory reduction of dividend from £4 13s. 4d. per cent. to the lower rate now recommended—viz., £4 4s. per cent. per annum.

There has been an increase during the past six months of 1679 in the number of consumers, and of 16,600 in the number of gas-stoves sold and let on hire.

The number of the Company's employees on active National Service is now about 2200. The Directors much regret that the list of casualties has been heavy. To the relatives of the brave men who have fallen, as well as to the suffering wounded, the shareholders will no doubt wish to join with the Directors in offering sincere sympathy.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distributing Departments with certificates that all the Company's works and plant have been maintained in thorough efficiency.

CORBET WOODALL, *Governor.*

Horseferry Road, Westminster, S.W., July 20, 1915.

The Accounts.

The accounts accompanying the report consist of the usual statements.

The statement of capital (stock) sets forth that the total paid-up is £10,413,480; added on conversion, £12,832,955—total amount authorized, £23,246,435. Deducting the amount redeemed, £226,995, the total amount of the Company's existing capital powers is £23,019,440. The statement of loan capital stands thus: Total paid up, £3,186,660; added on conversion, £1,618,190; unissued, £750,000—total amount authorized, £5,554,850.

The capital account shows receipts (with premiums, £1,688,957 14s. 8d.) to the amount of £29,513,247 14s. 8d. The expenditure is shown in the following items:—

Expenditure to Dec. 31, 1914			£14,880,254 7 11
Expenditure during the half year to June 30, 1915—viz.,			
Buildings and machinery in extension of works	£18,625 16 1		
New and additional mains and service-pipes	8,163 11 0		
Do. do. meters	8,633 13 8		
Do. do. stoves	17,871 5 8		
		53,294 6 5	
			£14,933,548 14 4
By sale of surplus land	£ 7,453 7 8		
„ depreciation of plant	27,172 11 2		
„ depreciation of meters and stoves	62,382 10 5		
„ depreciation fund (works on leasehold lands)	12,000 0 0		
		109,008 9 3	
Total expenditure			£14,824,540 5 1
Nominal amount added on conversion			14,451,145 0 0
			£29,275,685 5 1
Deduct amount of capital redeemed under Company's Act of 1903			226,995 0 0
			£29,048,690 5 1
Balance of capital account			464,557 9 7
			£29,513,247 14 8

The total of the net revenue account is £1,014,578 1s., compared with £1,157,928 at June 30, 1914. The balance applicable to the redemption fund and to dividend on the ordinary stock is £784,588 17s. 9d.; and the following statement shows how it is proposed to appropriate it:—

June, 1914.			
£614,053	..	Net balance brought from last account	£384,538 3 10
334,477	..	Net revenue for the half year	400,050 13 11
£948,530			£784,588 17 9
15,000	..	Contribution to redemption fund	5,000 0 0
£933 530			£779,588 17 9
(£4 17s. 4d. p. ct.)		Dividend on the ordinary stock—	
£398,164	..	£4 4s. per cent. per annum on £16,357,205	343,501 6 1
52	..	Forfeitures for deficiency in illuminating power	29 0 0
£535,314	..	Balance carried to next account	£436,058 11 8

The three statements relating to the reserve, special purposes, and depreciation funds stood as follows on June 30: Reserve fund, £74,726; special purposes fund, £307,536; depreciation fund, £91,128.

The following is the revenue account:—

Expenditure.

June Half Year, 1914.		£ s. d.	£ s. d.
	Manufacture of gas—		
£788,402	Coal, including all expenses thereon	713,214 15 9	
80,410	Oil „ less value of oil tar	10,235 9 7	
51,581	Coke and breeze used in the manufacture of carburetted water gas	67,384 18 11	
15,941	Salaries of Engineers and other officers at works	15,574 9 10	
96,937	Wages	88,636 8 11	
14,746	Purification	12,905 8 5	
245,879	Repair and maintenance of works and plant, materials and labour, less received for old materials, £6643 6s. 6d.	240,200 6 3	
	Distribution of gas—		1,239,151 17 8
61,277	Salaries and wages of officers (including rental clerks)	61,547 4 0	
99,753	Repair and maintenance of mains and service-pipes, &c.	90,013 17 4	
81,768	Repair and renewal of meters	89,440 9 11	
92,402	„ „ stoves	97,974 14 1	
20,804	Gas-fittings, including labour (automatic meter supplies)	13,363 9 2	
			352,339 14 6
26,234	Public lamps—lighting and repairing	..	25,971 12 3
	Rents, rates, and taxes—		
7,163	Rents payable	7,175 0 7	
168,172	Rates and taxes	168,301 3 1	
			175,476 3 8
	Management—		
3,750	Directors' allowance	3,750 0 0	
304	Company's Auditors and Assistant	302 2 0	
9,536	Salaries of General Manager, Secretary, Accountant, and clerks	9,426 17 5	
27,022	Collectors and cashiers	28,080 7 0	
4,985	Stationery and printing	4,673 2 6	
6,509	General charges	6,112 5 4	
			52,344 14 3
	Co-partnership, for twelve months to June 30, 1915	29,953 0 2	
22,653	Less on Account	17 000 0 0	
			12,953 0 2
2,079	Parliamentary charges	..	50 0 5
1,502	Law charges	..	554 4 11
..	Charges *re* Quinquennial re-valuations	..	1,050 0 0
4,975	Bad debts	..	7,012 2 7
500	Depreciation fund for works on leasehold lands	..	500 0 0
27,487	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	27,439 5 3
..	Allowances to employees on Active Service	..	7,135 16 1
3,193	Workmen's compensation account	..	1,496 16 3
4,526	Company's Contribution under National Insurance Act, 1911	..	3,883 1 6
	Public officers—		
1,258	Gas Referees and Official Auditor	1,258 1 0	
685	Public testing-stations	567 19 6	
			1,826 0 6
£1,978,433			1,909,184 10 0
538,875	Balance carried to net revenue account		630,039 17 2
£2,517,308			2,539,224 7 2

Revenue.

June Half Year, 1914.		£ s. d.	£ s. d.
	Sale of gas—		
	Per meter at 2s. 8d., 3s., 2s. 4d., and 2s. 10d. per 1000 cubic feet	1,805,640 13 2	
£1,662,273	Public lighting and under contracts	49,103 16 8	
61,680			1,854,744 9 10
£1,723,953			
74,416	Rental of meters	..	76,276 18 8
72,580	Rental of stoves	..	77,584 19 8
90,220	Rental of fittings	..	85,123 12 2
	Residual products—		
£311,006	Coke, less labour, &c.	254,980 13 9	
23,230	Breeze, less „ „	31,512 8 1	
101,393	Tar and tar products	77,093 13 6	
114,438	Ammoniacal liquor and sulphate of ammonia	81,862 2 7	
			439,448 17 11
£550,067			
£5,772	Rents receivable		5,830 13 11
300	Transfer fees		214 15 0
£2,517,308			2,539,224 7 2

The following statements relate to the working:—

Statement of Coal, &c.

Description of Coal.	In Store Dec. 31, 1914.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1915.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	130,423	778,259	731,357	1417	175,908
Cannel	8,416	2,315	5,339	..	5,392
Total	138,839	780,574	736,696*	1417	181,300

* In addition to this quantity of coal, 11,675,747 gallons of oil were used during the half year.

Statement of Residual Products.

Description.	In Store Dec. 31, 1914.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store, June 30, 1915.
Coke—tons	61,694	455,068	91,302	413,802	11,658
Breeze—tons	17,164	107,293	12,275	110,947	1,235
Tar, from coal only—galls.	1,957,754	7,713,987	6,909,754	485,556	2,276,431
Ammoniacal liquor—butts	22,676	206,823	209,418	..	20,081

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*14,411,622	284,639	13,169,114	13,630,560	44,766
†15,411,624	467,073	13,592,381	14,252,531	45,108

* Including 4,802,270,000 cubic feet of carburetted water gas. † June half year, 1914.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £165,951; gas oil, £41,958; coke, £6988; tar and ammoniacal liquor and products, £96,663; and sundries, £384,477. The figures this time last year were: Coal, £197,925; gas oil, £38,014; coke, £60,220; tar, ammoniacal liquor, and products, £82,993; sundries, £336, 247.

SOUTH METROPOLITAN GAS COMPANY.

The Directors' Report and the Accounts.

THE following is the report of the Directors of the South Metropolitan Company for the six months ended the 30th of June, which, with the accounts (an abstract of which appears below), will be presented to the proprietors at the half-yearly meeting to-morrow week.

Notwithstanding the increase to 2s. 10d. per 1000 cubic feet in the price charged for gas, and the consequent reduction of dividend by the sliding scale to £4 8s. per cent. per annum, the working for the half year shows an increase in the amount to be carried forward of only £3589.

This result is entirely accounted for by the extraordinary prices charged for coal and its freightage to London—some of these being nearly treble those paid in recent years. It is significant that the Government are at last applying to coal suppliers the same principles which have been in operation for forty years with regard to gas suppliers—viz., parliamentary regulation of the prices to be charged. The freight question can be solved by the purchase of steamers; and this course has now been adopted.

The consumption of gas shows a decrease of 3·73 per cent. as compared with the corresponding period of last year. The decrease is accounted for by the enforced reduction of outside lighting.

Residuals show an appreciable improvement, mainly owing to the increased value of fuel and the activity of the chemical industry.

In order to provide for the extending requirements of the business, stock to the amount of £100,000 is being offered to the Company's employees and gas consumers.

Owing to a large number of employees having joined His Majesty's Forces, it has been found necessary, in the clerical and commercial branches of the Company's business, to engage female assistants. The result has been in every way satisfactory.

The co-partnership continues to work smoothly and well; the employees bearing with the shareholders and consumers the results of the increased cost of raw materials.

CHARLES CARPENTER, *Chairman.*

709, *Old Kent Road, S.E., July* 28, 1915.

The Accounts.

The following are the principal portions of the accounts accompanying the preceding report.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5,328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

Capital account to Dec. 31, 1914			£5,120,441 5 11
Expenditure during half year to June 30, 1915—viz.:			
New buildings and machinery in extension of works	£87,850 0 0		
New and additional mains and services	2,086 2 7		
New and additional meters	2,379 2 8		
New and additional stoves	2,980 5 11		
		95,295 11 2	
Total expenditure			£5,215,736 17 1
Balance			113,083 2 11
			£5,328,820 0 0
Nominal amount added by conversion, less premium			2,996,520 0 0
Total			£8,325,340 0 0

The net revenue account shows a sum of £146,249 7s. 5d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £198,451 11s. 11d.; renewal fund, £26,557 7s. 3d.; insurance fund, £26,707 7s. 5d.

The following is the revenue account:—

Expenditure.

Manufacture of gas—			
Coal into store, including £1068 10s. 6d. for London Port and tonnage dues	£592,260 15 11		
Purification	19,047 0 4		
Salaries of Engineer and Officers at works	19,066 11 3		
Wages (carbonizing)	50,352 19 7		
Repairs and maintenance of works and plant, less £2114 11s. 3d. received for old materials	100,703 0 9		
		£781,430 7 10	
Co-partnership		18,159 4 3	
Distribution of gas—			
Repair, maintenance, and renewal of mains and service-pipes	£32,347 9 4		
Salaries and wages of officers, including rental clerks	21,767 10 11		
Repair and renewal of meters	27,127 16 5		
Repair and renewal of stoves	27,496 18 4		
Repair and renewal of gas-fittings	23,270 18 2		
		132,010 13 2	
Public lamps, labour and materials £14,394 6s. 9d., less £13,891 15s. received for the same		502 11 9	
Rents, rates, and taxes—			
Rents payable	£1,579 6 6		
Rates and taxes	55,445 9 5		
		57,024 15 11	
Management—			
Directors' allowance	£2,853 7 6		
Salaries of Secretary, Accountant, and clerks	4,465 8 3		
Collectors { Ordinary	5,840 9 8		
Collectors { Slot meter	11,744 10 8		
Stationery and printing	4,039 6 7		
General charges	12,405 3 10		
Company's Auditors	112 10 0		
		41,459 16 6	
Miscellaneous—			
Law charges		1,294 9 11	
Parliamentary charges		11 7 2	
Bad debts		2,084 10 2	
Stolen from 928 slot meters broken open		163 10 1	
Superannuation, sick, and accident funds		12,120 7 7	
National Insurance Act charges		2,073 12 4	
Gas Referees and Official Auditor		239 13 6	
Leasehold renewal fund		500 0 0	
War Bonus and War fund		17,617 2 0	
Total expenditure		£1,066,698 2 2	
Balance carried to net revenue account		189,140 5 7	
		£1,255,838 7 9	

Receipts.

Sale of gas—			
Lady-day, at 2s. 4d. per 1000 feet	£437,530 1 10		
Midsummer, at 2s. 10d. per 1000 feet	350,584 10 3		
	£788,114 12 1		
Public lighting	12,590 15 10		
		800,705 7 11	
Company's meters at rent: Ordinary, 94,941; slot, 277,102	£42,926 19 3		
Company's stoves at rent: Ordinary, 85,320; slot, 231,7·0; fires, 50,650	38,175 13 3		
Gas-fittings	49,175 0 10		
		130,277 13 4	
Residual products—			
Coke, less labour and cartage	£202,691 17 7		
Breeze, " "	8,829 12 2		
Tar and tar products, less labour	50,304 8 11		
Sulphate of ammonia " "	61,489 15 10		
		323,315 14 6	
Rents receivable		1,470 19 6	
Transfer fees		68 12 6	
Total receipts		£1,255,838 7 9	

Total amount paid in salaries for half year, £46,427 11s. 10d.
" " " wages " £302,253 19s. 5d.

The following tables relate to working:—

Statement of Coal.

In Store Dec. 31, 1914.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1915.
Tons.	Tons.	Tons.	Tons.	Tons.
189,837	534,331	569,539	1131	153,498

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
6,936,706	116,345	6,510,378	6,710,883	24,834

Statement of Residual Products.

Description.	In Store Dec. 31, 1914.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1915.
Coke—tons	52,205	350,174	93,290	284,880	24,209
Breeze—tons	34,366	61,858	30,991	33,436	31,797
Tar—gallons	439,060	5,392,843	5,168,176	14,672	649,055
Ammoniacal liquor—butts	12,110	213,900	216,464	..	9,546

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £149,608; coke and breeze, £35,677; tar, ammonia, and products, £65,909; and sundry plant and stores, £351,651. The figures this time last year were: Coal, £137,573; coke and breeze, £62,276; tar,

ammonia, and products, £71,078; and sundry plant and stores, £331,157.

A sum of £88,606, co-partnership bonuses and savings, has been deposited with the Company; and the total of the superannuation and guarantee funds is £80,245. The figures last year were £63,301 and £71,305.

COMMERCIAL GAS COMPANY.

Half-Yearly Report.

THE following is the report for the first six months of this year, which the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday.

The Directors submit the accounts for the half year ended June 30, 1915. The revenue account shows a net profit for the half year of £63,640 8s. 6d., which, added to the balance of £61,275 1s. 11d. brought forward from the previous half year, produces a net revenue balance of £124,915 10s. 5d. Deducting therefrom £8872 6s. 6d. for interest, there remains standing to the credit of the net revenue account a balance of £116,043 3s. 11d. available for dividend. The Directors recommend the payment of dividends at the statutory rates of £4 18s. 8d. per cent. per annum upon the 4 per cent. stock of the Company, and of £4 13s. 4d. per cent. per annum upon the 3½ per cent. stock, both less income-tax. Owing to the increase in the cost of coal and other raw materials, and the extra payments to the Company's workmen by reason of the war, the Directors have found it necessary to increase the price of gas from 2s. 4d. to 2s. 8d. per 1000 cubic feet as from the taking of meter indices at the Lady-Day quarter. The balance of the net revenue will be carried forward to the next half year.

WILLIAM GRAHAM BRADSHAW, Chairman.

Gas-Works, Stepney, July 28, 1915.

The Accounts.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 30th of June amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,457,835 10s. 10d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,670,648 0s. 10d. There is thus a balance of £64,582 16s. 5d. carried to the balance-sheet. A sum of £11,218 16s. 1d. was expended during the half year on new and additional steamship, mains, services, stoves, &c.; but £1227 17s. 9d. is credited for prepayment meters and fittings. The reserve fund amounted at the close of the half year to £41,328, and the insurance fund to £34,896.

The following statements relate to the working:—

Statement of Coal and Oil.

—	In Store Dec. 31, 1914.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store June 30, 1915.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	21,512	90,645	86,253	731	25,173
Oil—gallons	353,878	1,542,257	1,543,700	..	352,435

Statement of Residual Products.

Description.	In Store Dec. 31, 1914.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1915.
Coke—tons	4,331	53,908	6,620	49,427	2,191
Breeze—tons.	5,266	6,269	..	7,423	4,112
Tar—gallons.	434,610	1,153,497	..	1,171,029	417,078
Ammoniacal liquor—butts of 108 gallons	11,187	31,130	36,240	..	6,077
Sulphate of ammonia—tons	160	1,186	..	1,216	130

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,910,687	23,811	1,728,290	1,780,761	3,826

The last statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £26,863; coke and breeze, £1801; tar, ammoniacal liquor, sulphate of ammonia, &c., £8884; sundry stores, £40,639—total, £78,188. The figures this time last year were: Coal, oil, &c., £30,055; coke and breeze, £9584; tar, ammoniacal liquor, sulphate of ammonia, &c., £8620; sundry stores, £34,912—total, £83,171.

The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal and oil, including dues, carriage, unloading, and trimming	£113,457 14 0	
Salaries of Engineer and officers at works	3,436 8 2	
Wages (carbonizing)	11,045 15 0	
Purification, including labour	1,043 6 10	
Repair and maintenance of works and plant, materials and labour (less £320 17s. 3d. received for old materials)	24,719 19 11	
		£153,703 3 11
Profit sharing		2,665 15 7
Distribution of gas—		
Salaries and wages of officers (including rental clerks)	£5,584 16 7	
Repair, maintenance, and renewal of mains and services, material and labour	8,561 16 9	
Repair and renewal of meters	2,648 11 6	
" " " " stoves	11,097 3 6	
" " " " prepayment meters and fittings.	11,991 12 9	
Maintenance of mantles and fittings	1,243 19 9	
		41,528 0 10
Public lamps—lighting and repairing.		2,534 12 2
Rent, rates, and taxes		17,646 7 1
Management—		
Directors' allowance	£1,250 0 0	
Company's Auditors	75 0 0	
Salaries of Secretary, Accountant, and clerks	1,119 16 8	
Collectors' salaries and commission	1,561 13 1	
Prepayment meter collection	3,779 9 10	
Stationery and printing	994 12 1	
General charges.	2,261 12 4	
		11,042 4 0
Bad debts		298 6 2
Law and parliamentary charges		107 5 11
Superannuations and allowances and Workmen's Benefit Society, &c.		2,469 11 3
Official officers, &c.		100 10 10
National Health and Unemployment Insurance		527 9 11
Total expenditure		£232,626 7 8
Balance carried to net revenue account		63,640 8 6
		£296,266 16 2

Receipts.

Sale of gas—		
Per meter (number in use, 114,674) at 2s. 4d. and 2s. 8d. per 1000 cubic feet	£212,133 7 5	
Public lighting and under contracts	4,797 16 6	
	£216,931 3 11	
Less discounts and allowances	7,533 15 10	
		£209,397 8 1
Rental—		
Meters (24,270)	£2,925 5 9	
Stoves (79,851)	12,809 3 3	
Prepayment meters and fittings (89,716)	18,378 3 2	
Maintenance of mantles and fittings	777 3 0	
		34,889 15 2
Residual products—		
Coke, less £3965 8s. 7d. for labour	£31,308 8 8	
Breeze, less £959 2s. 5d. for labour	1,277 15 7	
Tar	8,747 3 6	
Ammoniacal liquor and sulphate of ammonia	10,623 15 2	
		51,957 2 11
Miscellaneous receipts—		
Rent receivable	—	
Transfer fees.	22 10 0	
		22 10 0
Total receipts		£296,266 16 2

An Interrupted Gas Supply at Calgary.

On Saturday, June 26, the "Calgary Daily Herald" issued an extra edition, consisting of a single page of print, on pink paper, headed with this announcement: "Owing to the failure of the gas supply, the 'Herald' composing-room and the mechanical departments are unable to run this morning. This issue, which is being distributed free, is simply for the purpose of informing the public as to the gas situation." The cause of the trouble was a great tornado, which, in addition to killing and injuring various persons, had extensively damaged the gas-mains. The President of the Gas Company (Mr. Eugene Coste) stated that several thousand feet of gas-main had been washed out between Sandstone and Okotoks, and that the Company hoped to have repairs made and the supply on again by 8 o'clock that night [the tornado was on the previous evening]. He added that a special train, with a repair gang and the necessary new pipe [in charge of General Superintendent Pearson], had been sent out, but that there was some doubt as to when they would reach the scene of the break, owing to the fact that the Canadian Pacific Railway line had also been damaged. It is to be hoped that the special train reached its destination without hindrance, and that the restoration of the gas supply was not postponed in consequence of the alternative course of employing teams from Sandstone having to be adopted.

Circular Gas-Fires.—Since the paragraph was written referring to the new circular gas-fire introduced by Messrs. Rogers and Cadwallader [p. 177], our attention has been called to an old list issued by Messrs. John Wright and Co., in which a circular fire, also with upright radiants, is illustrated. The name given to this gas-fire is the "Momiji;" and it is on a stand, and has a hood, very similar to the one referred to in our columns. Whether the internal construction is the same, we have no means of telling. The illustration of the "Momiji" fire does not show a flue connection; but, of course, there is not the slightest reason why one should not be provided. This fire produced by Messrs. John Wright and Co. has, we are informed, been made and sold for many years past for use in various parts of the world.

COKE-BUNKERS AT THE GLASGOW GAS-WORKS.

Reinforced Concrete Construction at Dalmarnock.

In the number of the "Builder" for the 16th ult., there appeared some particulars of a general scheme of coke-bunkers erected at the Dalmarnock Gas-Works of the Glasgow Corporation, to the design and under the supervision of Mr. Alex. Wilson, M.Inst.C.E., the Manager of the Gas Department. The reinforced concrete construction was by Messrs. Johnson, Clapham, and Morris, Limited, of Manchester, and was carried out by them on their "Lattice" and "Keedon" system. We are indebted to our contemporary for the following account of the work and for the illustrations by which it is accompanied. For additional particulars as to the method of construction, readers may be referred to the paper by Mr. Thomas Carmichael, read before the Scottish Junior Gas Association (Western District), which appeared in the "JOURNAL" for March 23 last, pp. 752, 753.

The advantages of reinforced concrete over steel and timber construction can probably be realized more fully in the building of coke-bunkers than any other type of structure, on account of its fire-resisting qualities and lack of maintenance costs. A very good example of a reinforced concrete coke-bunker is provided by the scheme which has just been completed at the Dalmarnock Gas-Works of the Glasgow Corporation, to work in conjunction with the new vertical retort plant that has been installed there.

To appreciate the value of the material employed, it must be understood that the coke is deposited in the bunkers after being drawn from the retorts; and although water is applied to extinguish the fire, there is a great tendency for the coke to rekindle. Thus a fire-resisting material is absolutely necessary. If steel is used, buckling and distortion are unavoidable; and the bunker in consequence becomes seriously damaged. But this distortion does not occur with reinforced concrete; and the latter material is therefore becoming almost universal with managers and engineers dealing with gas-works.

The over-all dimensions of the Glasgow bunker are 104 feet long by 84 feet wide and 48 feet high fromthe rail level; and it has a total capacity of about 4000 tons. It is divided into two sections by a transverse wall; and these sections are in turn divided into four subsections by other walls, to enable stores of coke of four different sizes being stocked ready for delivery. A general view of the bunker is shown in fig. 1. It will be seen that it is supported by columns to allow of the passage of traffic under the building; and these columns are all constructed in reinforced concrete of sizes varying from 18 inches square to 36 inches square.

The loads on the main columns are over 300 tons each; and as the bearing capacity of the soil could not safely be considered as more than 1 ton per square foot, special continuous reinforced footings were arranged under each row of columns.

The hopper bottoms, which are sloped at an angle of 45 degrees, are formed with reinforced concrete, 8 inches thick; and the outlets are placed at a height of 10 feet above rail level, to allow railway waggons and carts to pass directly under the hopper valves, so that the coke is discharged directly into them.

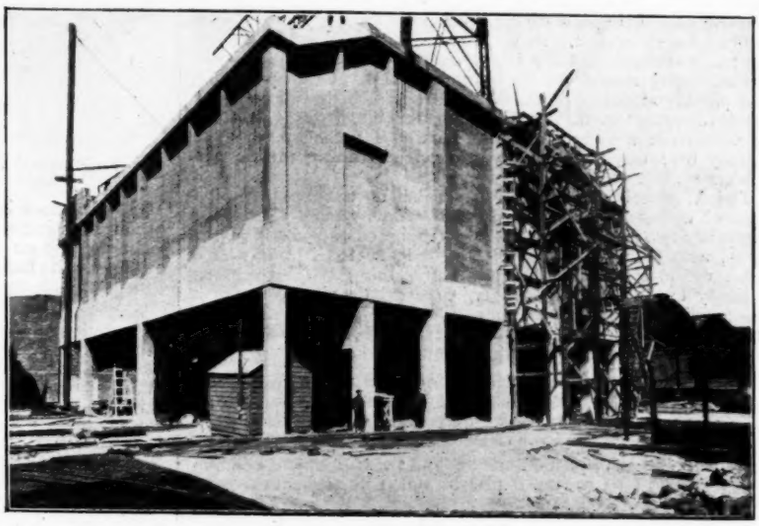


Fig. 1.—Coke-Bunker at the Dalmarnock (Glasgow) Gas-Works.

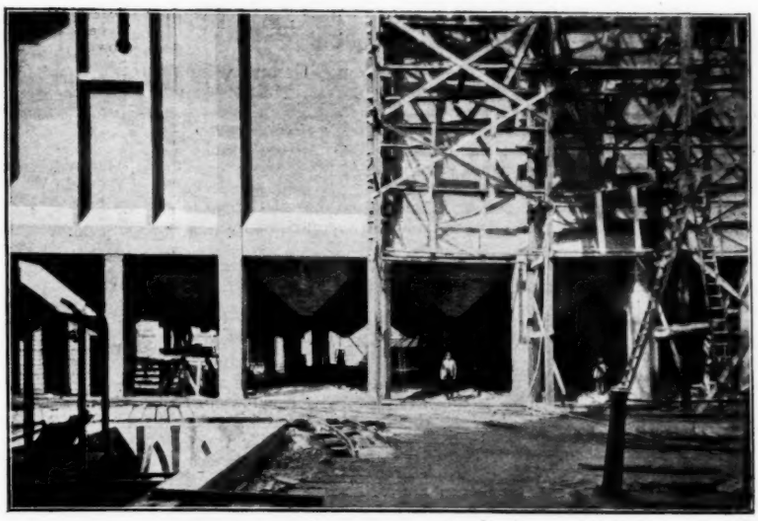


Fig. 2.—Coke-Bunker at Glasgow: A View showing the Hoppers.

Owing to the compartments being of varying sizes, and the divisional walls being exceptionally long without a break, they were stiffened by the introduction of vertical members connected by cross ties and bracings from side to side of the bunkers.

The external walls are also stiffened by piers, which project on the outside at regular intervals throughout the length; and these piers are connected to horizontal beams at the top and bottom of the wall, thus forming recessed panels. These improve the appearance of the structure while providing efficient and economical construction. The projecting piers can be seen in figs. 1 and 2; and the latter view also shows the hoppers at the bottom of the bunker.

Société Technique du Gaz en France.

It was mentioned in the "JOURNAL" some weeks ago that the Committee of this Society had been considering the question of holding the annual congress this year, and had come to the conclusion that, if it could not be held some time in August, it would have to be abandoned. Circumstances arising out of the present condition of affairs in France necessitate the constant personal supervision of gas managers of the works under their control; and therefore the Committee have decided not to hold the congress, but to defer it till next year. The "Transactions" for the past year will, however, be published in due course; and in order to avoid any break in the series of volumes, one will be issued containing a Roll of Honour of the gas industry as well as some interesting features of the current year—such as the supply of coal to gas-works, the utilization of tar for the manufacture of explosives, &c. It may be remembered that the issue of the Society's organ, the "Journal des Usines à Gaz," was interrupted by the outbreak of war; but it will now appear regularly on the 5th and 20th of each month, as before.

POWER PRODUCTION.

The "£ s. d." of the Question.

By H. C. Widlake, M.J.Inst.E., of the Plymouth and Stonehouse Gaslight and Coke Company.

(*Concluded from p.* 186.)

The British Westinghouse High-Power Gas-Engine.

Foremost among firms whose excellent work has given such an impetus to the manufacture of the high-power gas-engine in England may be named the British Westinghouse Company, of Trafford Park, near Manchester, whose Board of Directors, some three years ago, considered the advisability of taking up the manufacture of the slow-moving horizontal type of gas-engine as used on the Continent. In view, however, of the small demand for these engines, and the heavy capital outlay in laying-down the necessary manufacturing plant, and also the success which had already attended the Company's efforts in the direction of the development of the high-speed gas-engine, it was decided to go forward in the same direction as that in which efforts had already been directed—namely, the manufacture of the vertical tandem engine.

The Westinghouse tandem gas-engine is arranged with the lines of cylinders mounted vertically side by side. Each line comprises two single-acting cylinders mounted one on top of the other, with their pistons coupled and connected to one crank. Each cylinder operates independently, and goes through the ordinary Otto four-cycle stroke. Compared with the use of a single cylinder of large dimensions the advantages gained by the above described construction are of great importance to the power user, and may be summarized as follows:—

(*a*) An exceedingly even turning movement, which places this type of engine on a par with the triple-expansion steam-engine, or even, so far as practical considerations are concerned, with the electric motor or steam-turbine.

(*b*) A limitation of piston diameter and the consequent elimination of water-cooled pistons and their consequent complication.

(*c*) Maximum economy as regards floor space, and the consequent saving in the cost of foundations.

(*d*) The engine, being essentially a high-speed machine, the moving parts are relatively small, and there is no necessity for the heavy and expensive overhead cranes which are such a feature of slow-speed plants.

The advantages claimed by the Westinghouse Company for this type of engine are: Low gas consumption; compact design, allowing a maximum power to be installed in a given space; steady turning movement, giving a cyclic regularity equal to the best high-class steam-engine; reliability equal to steam installations; maintenance as low as the best steam plant; and continuous rating. The makers claim, in addition, that the engine is easy to start; that, being enclosed, it is clean, and allows cleanliness in the engine-room; and that the lubricating oil consumption is extremely low.

Among the many interesting plants driven by this class of engine the following examples may be quoted.

Important Installations of Westinghouse Engines.

At the Hollins Mill Company, Marple, there is an installation consisting of a 750 B.H.P. 200 R.P.M. engine, giving a good example of a gas-engine driving a cotton mill through ropes—the rope pulley forming the engine flywheel. There are no friction clutches or other devices whatever to ease the load at starting. The engine, as stated above, has now been installed for over three years. A comparison of the cost of running between this portion of the mill driven by the gas-engine, and another portion steam driven, shows that the steam cost is a little more than twice as much as the gas-engine cost. At the works of the Castner Kellner Company, in Runcorn, there are two 1000 H.P. engines, and four 750 B.H.P. engines, direct coupled to direct current generators supplying current for electrolytic work. The service is exceptionally severe; and it would appear that the engines have met the work satisfactorily, as the installation has been extended from the initial one of four sets to the present one of six.

There are also Westinghouse installations at Messrs. Cadbury Bros.; Messrs. Cammell, Laird, and Co.; Enfield Cycle Company; Messrs. Pilkington Bros., St. Helens; Messrs. Cochrane and Co., Middlesbrough; the Wednesbury Corporation; Littleton Collieries; and Messrs. Tweedales and Smalley. From this it will be seen that these engines are being used for practically every class of industrial work as well as municipal service. They are dealing successfully with the parallel running of alternators, and are driving direct-current generators with steady lighting loads, as well as with the rapidly fluctuating loads occurring in traction and some classes of industrial service. The merits of this particular engine, which is built in sizes of from 100 to 1000 H.P., are well worth investigating by anyone interested in gas plant.

Fig. 3 is an example of a typical Westinghouse vertical tandem engine working on town gas, and direct coupled to an alternator; while fig. 4 shows the private power station of a very well-known

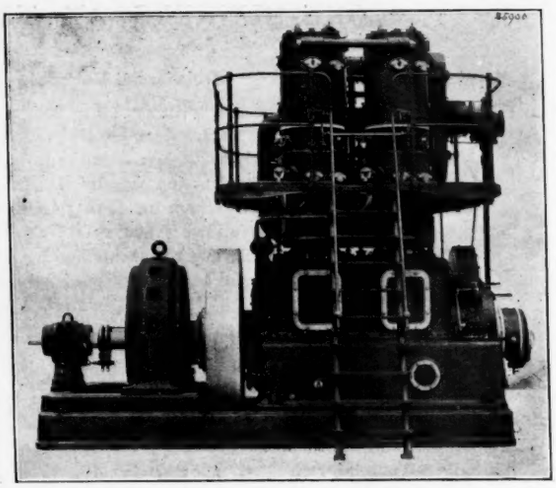


Fig. 3.—Westinghouse Tandem Gas-Engine Working on Town's Gas.

Midland engineering firm, the gas for which is generated in Dowson producers using gas coke for fuel. This plant has been in service since about 1902, and at present supplies 54 motors aggregating 1138 H.P.; the individual powers ranging from 6 to 100 H.P.

An Interesting Test.

A particularly interesting test was recently carried out upon a Westinghouse horizontal gas-engine at the Neepsend Gas-Works, Sheffield, and by the courtesy of Mr. J. G. Walthew, of the British Westinghouse Company, the author is privileged to include these particulars in this article.

The engine was guaranteed to have a consumption not exceeding 9500 B.Th.U. per brake-horse-power, and was tested by the engineering staff of the Sheffield Gas Company. Continuously taken calorimeter readings were used to decide the heat-value of the gas, while its quantity was measured through a standard meter, and a brake load applied to a special pulley fitted upon the crank-shaft of the engine determined the actual output.

Particulars of Engine.

Date of tests	May 2, 1913.
Type of engine	"Industrial," size S—9.
Power	32 max. B.H.P., 30 B.H.P. normal working load.
Speed	180 revs. per minute.
Bore of cylinder	11 inches.
Stroke of piston	19 inches.
Barometer pressure	29·8 inches mercury.

Full Load Test.

Average load during test	29·5 B.H.P.
Total gas used per hour (at 65° Fahr. and 0·75 in. water pressure	530 cubic feet
Total gas used per hour (corrected for 60° Fahr. and 30 in. mercury	523 ,, ,,
Cubic feet of gas per B.H.P. hour $= \frac{523}{29{\cdot}5}$	17·7 ,, ,,
Heat units per B.H.P. hour (gas 530 B.Th.U. net value) 17·7 × 530	9381 B.Th.U.

Three-Quarter Load Test.

Average load during test	24·7 B.H.P.
Total gas used per hour (at 66° Fahr. and 0·75 in. water pressure)	450 cubic feet
Total gas used per hour (corrected for 60° Fahr. and 30 in. mercury	443 ,, ,,
Cubic feet of gas per B.H.P. hour $= \frac{443}{24{\cdot}7}$	18 ,, ,,
Heat units per B.H.P. hour (gas 530 B.Th.U. net value) 18 × 530	9540 B.Th.U.

Half-Load Test.

Average load during test	17·5 B.H.P.
Total gas used per hour (at 60° Fahr. and 0·75 in. water pressure)	360 cubic feet
Total gas used per hour (corrected for 60° Fahr. and 30 in. mercury)	354 ,, ,,
Cubic feet of gas per B.H.P. hour $= \frac{354}{17{\cdot}5}$	20·2 ,, ,,
Heat units per B.H.P. hour (gas 530 B.Th.U. net value) 20·2 × 530	10,706 B.Th.U.

It will be observed that the consumption of full-load test was below that guaranteed; while the three-quarter and half-load tests were equally satisfactory. At 10d. per 1000 cubic feet, the power costs for this particular engine work out as follows:—

Full load	0·177d. per B.H.P. hour.
Three-quarter load	0·180d. ,, ,, ,,
Half load	0·202d. ,, ,, ,,

Fig. 5 is from a photograph of an engine of the standard type manufactured by the Westinghouse Company for industrial purposes. The main bearings of this engine are fitted with ring lubrication, while a pump fitted to the side of the engine, and operated by the side shaft, ensures a positive feed to the cylinder, piston, and gudgeon pin.

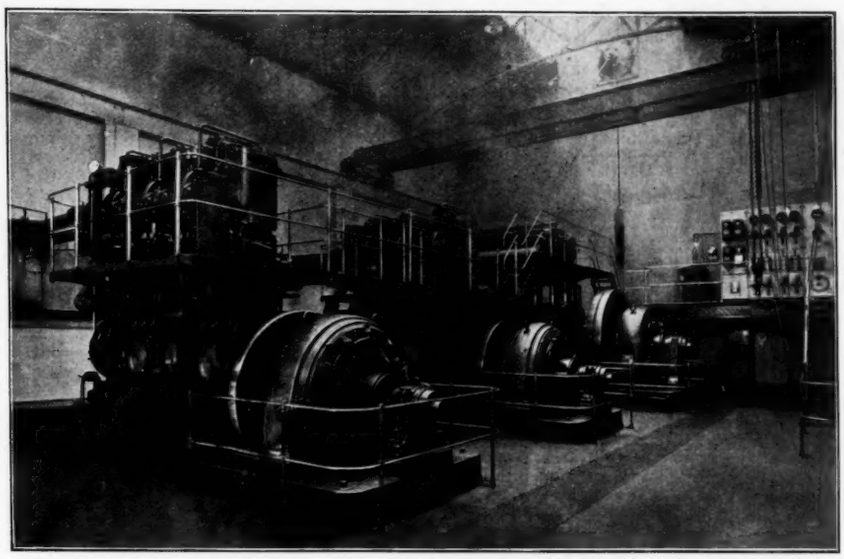


Fig. 4.—LARGE WESTINGHOUSE POWER PLANT WORKING ON GAS-COKE PRODUCERS.

It has been claimed in connection with this type of engine that the governing gear is of the simplest description, and while the above tests cannot but convince the reader of the efficiency of the engine, a reference to fig. 6 will certainly substantiate this claim for the governing gear made on the ground of simplicity.

An inlet cam on the side shaft operating upon A roller lifts a quadrant lever, upon the quadrant of which rests the lower end of the radius rod operating the inlet valve. The position of this rod on the quadrant—viz., its distance from the fulcrum on which the quadrant lever works—is regulated by the centrifugal governor of the engine, and consequently the amount of mixture admitted to the engine increases as the lower end of the radius rod recedes from the pin C. It is claimed that this system of governing—that is, by regulating the admission of gas and air direct at the inlet valve, a steadier turning movement is produced—the engine works more silently, while the wear and tear are considerably reduced. The impulses given to the piston vary in strength according to the amount of mixture entering the cylinder, while at the same time the proportion of gas and air is kept approximately constant irrespective of the load, thus ensuring reliable ignition under all conditions. It will be observed from the photograph that the simplicity of the design enables the governing gear to be kept clear of the casing containing the gas and air valves, thus facilitating the withdrawal of the casing for the purpose of examination or grinding in.

It has been claimed that the gas consumption is less with an engine governing on the hit-and-miss principle, but in the author's opinion this claim only holds water below half-load. With the hit-and-miss system, the compression is constant while the impulses are intermittent, and a heavy explosive stroke is followed by a series of misses according to the working load. This system of governing involves the use of heavy fly-wheels in order to compensate for the irregular turning movement; while unless special silencing arrangements are provided, the exhaust is noisy and objectionable. The use of variable admission governing gives excellent economy at all economical load factors, and enables an internal combustion engine to operate as smoothly as a steam-engine.

In presenting the foregoing data, the writer desires to express his thanks to Mr. Edward G. Hiller, the Chief Engineer of the National Boiler and General Insurance Company, for the courteous permission which has enabled him to quote from, and use data contained in, that gentleman's able paper on "Power Production in the United Kingdom," read in January of last year before the Manchester Association of Engineers.

His thanks are due also to Messrs. Crossley Bros., of Openshaw, Manchester, for particulars concerning the Vennell-Coster patent coupling, and to the British Westinghouse Engineering Company, of Trafford Park, Manchester, for details as to the vertical gas-engines for whose manufacture the firm are famous.

In this latter connection, the author also desires to express his appreciation of the courtesy of Mr. J. G. Walthew, of the British Westinghouse Company, whose permission has enabled him to make use of the tests of the engine used at the Neepsend gas-works, together with particulars of same, given in the able paper read by Mr. Walthew in the latter part of last year before the Manchester Association of Engineers.

In conclusion, the author desires to express his obligation to Mr. P. S. Hoyte, the Chief Engineer to the Plymouth and Stonehouse Gaslight and Coke Company, for the able assistance and collaboration rendered him in the compilation of this article, and for the courteous permission which has enabled him to lay same before "JOURNAL" readers.

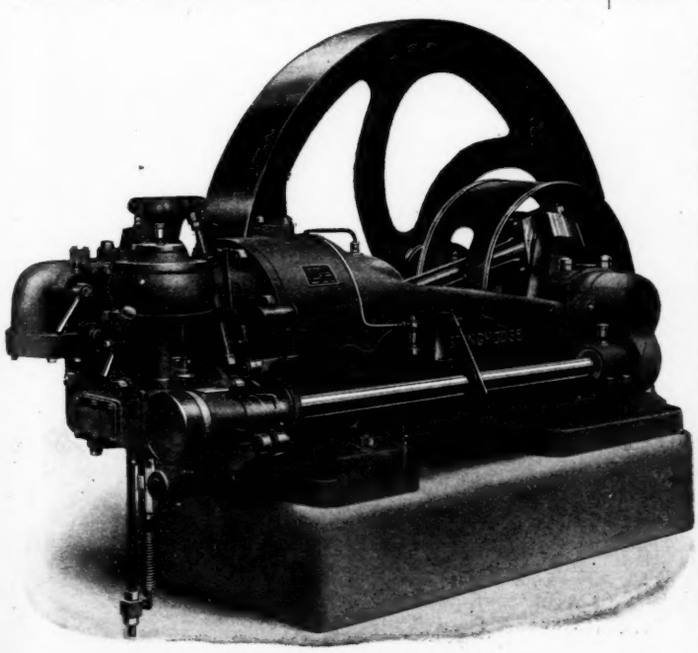


Fig. 5.—The Westinghouse Company's Standard Type of Engine.

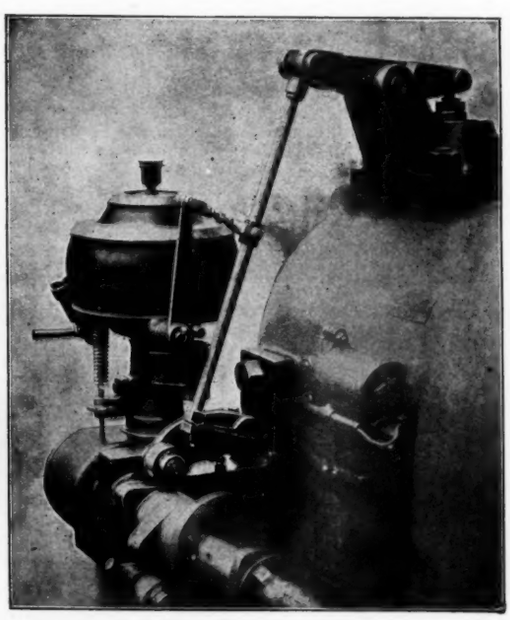


Fig. 6.—Governing Gear of the Westinghouse Gas-Engine.

DETERMINATION OF PRUSSIAN BLUE IN WASHER SLUDGE AND SPENT OXIDE.

The following is an abstract translation of an account given in the "Zeitschrift für angewandte Chemie" in September last of a research undertaken by Dr. G. Anderson, of the Hanover works of the Imperial Continental Gas Association, when he was working under Professor W. Eschweiler at the Technical College at Hanover.

Differences frequently arise in results of determinations of the cyanogen in cyanide washer sludge. The method of determination worked out by Dr. Bueb, as employed at the "Residua" Chemical Works, which deals with the sludge produced in Bueb washers on German gas-works, is as follows: 50 grammes of the well-stirred sludge is boiled with 100 c.c. of a solution of caustic potash of 1·26 specific gravity and about 200 c.c. of water, in order to get rid of the ammonia. When cold, the whole is made up to 1010 c.c.; 10 c.c. being allowed for insoluble matter. After agitation, the liquid is filtered through a dry filter and 25 c.c. of the filtrate is taken, 50 c.c. of water and 10 c.c. of dilute sulphuric acid (100 c.c. 1·84 acid made up to a litre) are added, and it is titrated with solution of sulphate of zinc, of which 1 c.c. corresponds with 0·01 gramme of potassium ferrocyanide, $K_4Fe(CN)_6 + 3H_2O$. The end point of the reaction is ascertained by the drop method, using filter paper and 1 per cent. solution of ferric chloride. The drop of ferric chloride solution and the drop of liquid under test are placed on the paper so that only their edges touch. The end point is, however, a subjective phenomenon, and is much affected by the method of lighting. Consequently differences of tenths per cent., making 10 per cent. of the total, readily occur with different analysts.

The end point of the titration is affected by addition of sulphuric acid and by dilution; but errors arising from these causes can be offset by taking, in the standardization of the zinc sulphate solution, the quantities of acid and water which are prescribed for the titration of the cyanogen sludge. Sulphocyanide also is formed to some extent from the sulphur present in spent oxide when the liquid is boiled as directed for thirty minutes. After thirty minutes' boiling the ferrocyanide may be underestimated on this account by about 1 per cent. The main disadvantage of the method is, however, the difficulty in recognizing the end point of the titration.

Knublauch's method of determining cyanogen has been shown by earlier investigators to be inexact. A method which is commonly used is Drehschmidt's, which is as follows: 10 grammes of spent oxide is brought into a half-litre flask with about 150 c.c. of water and 1 gramme of ammonium sulphate. Then 15 grammes of mercuric oxide are added. The whole is boiled for about a quarter of an hour. After cooling, ½ c.c. to 1 c.c. of a solution of mercurous nitrate is added, with agitation, and ammonia until precipitation ceases to take place. The contents are then made up to the mark on the flask, and 8 c.c. of water (or 1 c.c. for cyanogen sludge) is added to make up for the volume of solid material. From the filtrate, 200 c.c., which corresponds with 4 grammes of spent oxide, are transferred to a 400 c.c. flask; at least 6 c.c. of liquid ammonia of ·91 specific gravity and 7 grammes of zinc dust are added; and, after repeated agitation, 2 c.c. of a 30 per cent. solution of caustic potash are added and the contents of the flask made up to 400 c.c. After thorough agitation they are filtered through a dry double filter. Of the filtrate, 100 c.c. (corresponding with 1 gramme of the spent oxide) are added to excess of decinormal silver solution in a 400 c.c. flask and acidified with dilute nitric acid. After agitation and settling, the contents are made up to the mark, agitated, and filtered through a dry filter. Of the filtrate, 200 c.c. are then titrated back with one-twentieth normal solution of ammonium thiocyanate, according to Volhard's process. The amount of the solution consumed corresponds directly to the excess of silver, and is deducted from the quantity of the latter used. Of decinormal silver solution, 1 c.c. corresponds with 0·002598 gramme of CN or 0·004771 gramme $Fe_7(CN)_{18}$.

The author investigated Drehschmidt's process on a solution of potassium ferrocyanide of known strength. Following Drehschmidt's directions, the consumption of silver nitrate solution corresponded with 96·25 per cent. of the quantity theoretically required. In two subsequent trials the liquid was boiled for thirty minutes (instead of the prescribed fifteen minutes), and the results were 99·18 and 99·23 per cent. of the theoretical quantity. In some subsequent trials thirty minutes' boiling was therefore adopted. In order to ascertain whether the mercurous nitrate got rid of chlorine, which would affect the subsequent determination of cyanogen by titration, the author made a trial in which he added 0·1 gramme of sodium chloride. The chlorine was not completely taken up even by an addition of 6 c.c. of mercurous nitrate solution. Three tests gave 125·7, 111·8, and 116 per cent. of the theoretical value.

In practice, such high results would not usually occur, as when the method is applied to cyanogen sludge it gives about the same results as other methods of determination. With Drehschmidt's method loss occurs through sulphocyanide formation. Two analyses, in which 1 gramme of sulphur was added to the potassium ferrocyanide solution, gave 94·94 per cent. and 96·88 per cent. of the theoretical value. The sulphocyanide unites with the mercurous salt, and is thus lost. Sludge from a cyanogen washer, tested according to Drehschmidt's method, but with thirty minutes' boiling, showed, in five successive determinations, 10·46, 10·19, 10·65, 10·35, and 10·55 per cent. of prussian blue. The mean of these figures—viz., 10·45 per cent.—agrees with the results found by the Feld-Witzeck method. The precautions necessary in the use of Drehschmidt's method are therefore that the boiling must be extended to thirty minutes, and the reagents must be free from chlorine.

The Feld-Witzeck method, as described by Witzeck, is as follows: Two grammes of spent oxide, or 0·5 gramme of washer sludge, are triturated for five minutes in a mortar with 1 c.c. of solution of ferrous sulphate (278 grammes per litre) and 5 c.c. of eight times normal solution of caustic soda (320 grammes per litre). Then there is slowly added, with constant stirring, 30 c.c. of three times normal solution of magnesium chloride; and the whole is washed into a 700 c.c. distillation flask with as much hot water as will bring the volume to about 200 c.c. After boiling for about five minutes, 100 c.c. of decinormal solution of mercuric chloride (27·1 grammes per litre) is poured into the boiling liquid, which is kept at the boil for ten minutes. The flask is then connected with a condenser, and 30 c.c. of four times normal sulphuric acid (392 grammes H_2SO_4 per litre) are run in through a tap funnel passing through a rubber plug, and distillation kept up for 20 to 30 minutes. The distillate is collected in a conical beaker containing 20 c.c. of twice normal solution of caustic soda (80 grammes per litre); the flask being closed with a rubber plug with two holes, through one of which the delivery tube of the condenser passes while the other carries absorption bulbs charged with caustic soda solution to exclude air from the system. After the addition of 5 c.c. of one-fourth normal solution of potassium iodide (41·5 grammes per litre), the distillate is titrated; the end point being shown by a milky yellow cloudiness. One c.c. of decinormal solution of silver nitrate (17·0 grammes per litre) will represent 0·009548 gramme of prussian blue.

The author checked the accuracy of this method, when carried out according to the foregoing instructions, on a solution of known strength of potassium ferrocyanide, and obtained erratic results, which were always low. He found that cyanide of mercury was not completely decomposed by sulphuric acid alone, and that the presence of a large excess of soluble chloride was necessary in order to secure complete decomposition. He then made a number of tests on the solution of potassium ferrocyanide, using 50 c.c. of three times normal solution of magnesium chloride instead of the 30 c.c. prescribed by Witzeck, and obtained results so little below the theoretical values that the deficiency was no more than might be expected from the inevitable departure of the salt from its theoretical composition. It is to be observed that if the boiling with magnesium chloride is extended beyond five to ten minutes a loss ensues, and a low result is obtained. With pure ferrocyanide and washer sludge it is immaterial whether the material is treated with the eight times normal solution of caustic soda in the cold or in the hot; but with spent oxide cold treatment is preferable, as heat is liable to produce sulphocyanide.

A comparison of the three methods on a sample of washer sludge showed that the Feld-Witzeck method gave the highest and most consistent results; that Drehschmidt's method (which, moreover, requires costly reagents) gave very variable results; and that Bueb's method gave concordant, but rather low, results. The Feld-Witzeck method has therefore been adopted for use for the past two years in the Hanover Gas-Works and the works by which its sludge is bought, and has worked satisfactorily.

About 20 grammes of sludge are weighed out exactly and then made up to 100 c.c. in a measuring flask, from which, after thorough agitation, 10 c.c. are taken and triturated for 5 minutes in a glass mortar with 1 c.c. of normal solution of ferrous sulphate and 5 c.c. of eight times normal solution of caustic soda. Then 50 c.c. of three times normal solution of magnesium chloride are added with constant stirring, and the whole is washed into a flask—the volume of liquid being brought to about 200 c.c. After boiling for 5 to 10 minutes, 100 c.c. of boiling decinormal solution of mercuric chloride are poured into the boiling liquid, and the boiling continued for ten minutes. The flask is then connected with the condenser, 30 c.c. of four times normal sulphuric acid are added, and the liquid is distilled for 20 to 30 minutes. The distillate is collected in 20 c.c. of twice normal solution of caustic soda. If it is cloudy, 0·5 gramme of lead carbonate is added to it in a measuring flask, which is filled to the mark, and an aliquot portion is taken for the titration, after the precipitate has been filtered off. The titration is carried out according to Liebig's method with decinormal solution of silver nitrate and the addition of 5 c.c. of one-fourth normal solution of potassium iodide. The appearance of a yellowish milky cloudiness indicates the end of the reaction.

The imports of "Solar" gas oil from Jan. 1 to June 28 amounted to 43,916,980 gallons. The total imports of all grades of oil amounted to 298,467,000 gallons.

We have received from Messrs. Constable and Co., Limited, a copy of "High Power Gas-Engines," by H. Dubbel. The book has been translated from the German, and edited and expanded so as to include British engines and British practice, by Mr. F. Weinreb. Pending a fuller notice of the work, it may be mentioned that the purpose of it is to deal with the theory, principles of operation, and most important constructional features of large four-cycle and two-cycle gas-engines.

A REMARKABLE SPARROW'S NEST.*

BIRD LIFE AND GAS.

By FRANK BONNETT, of Reading.

THE pair of house-sparrows which built their nest this summer in the top of one of the street gas-lamps at Reading—in the pyramidal space formed by the flat reflector near the top of the lamp and the four-sided sloping roof above it—have contributed a very eloquent testimonial to the hygienics of gas lighting. Had a test been carefully arranged to prove the innocuous effect of the vapour given off by a gas-burner in a confined space, no more convincing proof of its harmlessness, even under the most severe conditions, could have been brought forward. The products of combustion in this type of lamp pass directly through the hole in the centre of the reflector; so that any living creature within the space above would be subjected to the full current of the vapour and the induced air draught. Yet neither the sitting bird nor her eggs appear to have taken the slightest harm.

This is one interesting point; but there is another—namely, in regard to the question of heat. The temperature of the space in which the sparrow's nest was built has been carefully taken; and the thermometer showed that, after the lamp had been burning for two hours, a temperature of no less than 180° Fahr. was reached in this space. In other words, the eggs and the bird sitting upon them at night would seem to have been subjected to a heat within 32° of boiling point.

The history of this remarkable nest is as follows: For some time previous to an investigation of the lamp being made, the lamplighter had noticed that a pair of sparrows were building in the space above the reflector. The birds had been seen carrying in their nesting material, which must have been a feat of some difficulty seeing that all of it had to be conveyed through the narrow space between the roof of the lamp and the lower rim of the circular canopy with which it is surmounted. The building must thus have taken an exceptionally long time; and it redounds to the birds' credit that they completed their task with the utmost tidiness. The material used consisted mainly of grass, both green and withered; and in addition to the customary lining of feathers, there were a few bits of stuff, such as flannel shreds, string, &c. The whole formed a very inflammable collection; but although the edges of the nest were much charred, the centre was in no way affected by the great heat to which it must have been daily (or, rather, nightly) subjected.

The nest, most unfortunately, was removed by one of the Gas Company's workmen when it contained five eggs; and these upon examination proved to be in a partly incubated condition—the chicks within them being clearly formed. The eggs had probably been incubated for some five or six days; but as they were not examined until about a fortnight afterwards, it was not possible to be quite exact on this point. Apparently, however, there had been no interruption to the ordinary process of hatching, and there can be but little doubt that the young birds would have emerged in due course. It is a thousand pities that the nest was molested; for it would have been most interesting to watch the final result of this somewhat rash experiment. For example, supposing the birds had been successfully reared, would their parents have managed to show them the way out of their peculiarly situated nursery?

It has been assumed above that the hen sparrow, following her natural instinct, sat upon her eggs during the night; but it is, of course, possible that she found the heat too great after the lamp had been lighted for some time, and vacated the nest until the lamp was extinguished each morning, when she could resume her labours under conditions of greater comfort. Supposing she continued to incubate at night as well as by day, to what heat must the eggs have been subjected? This is another interesting problem. But even without the bird's assistance, the eggs would have been "kept going" by the heat of the lamp—indeed, it is remarkable that the latter did not, apparently, do its work too thoroughly. It appears to be established that eggs can stand a far greater heat than that usually employed in artificial incubators without taking any harm so far as their hatching possibilities are concerned; for had the temperature been too much for them, they would have been spoiled at the very commencement and there would have been no sign of chick development. One wonders whether the eggs would have hatched any sooner for being subjected to a heat so far above the normal!

The fact that gas, when employed for lighting under ordinary conditions, is not only harmless but actually beneficial to bird-life has, of course, long since been demonstrated. Some years ago gas lighting was installed in the "Rare Birds House" at the Zoological Gardens, Regent's Park, with the result that the system was found to be satisfactory in every way. Not only have the birds thrived, but their longevity has been perceptibly increased. The introduction of artificial light enables the birds, whose digestions are very rapid, to be fed during the long hours of darkness; and this has undoubtedly been of great benefit to them. At the same time, it is fair to assume that the improvement in the results obtained is largely due to the better circulation of the air brought about by the use of gas.

For some reason or other there appears to be an increasing fondness among birds for lamps as nesting places; for an unusual number of such cases have been reported this year. Mr. F. Primrose Stevenson, of Sutton, Surrey, writes to the "Selborne Magazine" about a blue tit's nest built inside the hollow standard below a gas-lamp at that place. He adds: "Immediately above is the bye-pass, and once every twenty-four hours the lamplighter inserts his stick over the nest-hole to light the incandescent burner, and for several hours afterwards a fierce glare beats down upon the little family of tits." The same writer states that exactly similar nests have been noted by him this year at Leatherhead and also at Hackbridge, at both of which places the gas-lamps and standards employed are practically similar to those at Sutton. In the "Great Western Railway Magazine" for July there also appears a description of a blue tit's nest at Bedwyn Station, with three photographs showing one of the parent birds taking food to the young. The lamp in this case is an oil one.

In none of these instances, however, are there any such remarkable features as those associated with the sparrow's nest at Reading. One can but hope that the same pair of sparrows, or another, will make a similar experiment at some future time, when it will be most interesting to note what eventually happens.

* This interesting article reminds of the experiences related by Mr. Doig Gibb and others as referred to in the "JOURNAL" just about three years since—see Vol. CXIX., pp. 216, 337, 530, 714.—ED. J.G.L.

AUTOMATIC OPERATION OF WATER-GAS PLANT.

In operating a water-gas plant for a number of years in a small gas-works, said Mr. C. F. Zeek, in the course of a paper read before the Southern Gas Association at Charleston (U.S.A.), he noticed from time to time marked improvement in manufacturing results over the daily average figures, without any apparent change in materials or manipulation of the plant. Sometimes the improvement was noticeable in only one direction, as, for instance, in generator fuel, or it might be in oil used per 1000 cubic feet, or, perhaps, in the quantity of gas made per hour. On other days all of these favourable factors might come together, with the result that unusual economy of materials per 1000 cubic feet was secured, as well as a cheapening of the labour item, by the increased output of the machine per hour. No doubt every superintendent in the land who had operated a single set, where the results on the one machine from day to day could be compared, had observed these apparent inconsistencies in his manufacturing results.

Taking note of the varying results on a plant for some months, and by a happy combination of watching and manipulation of the plant under favourable conditions, it was possible to discover some of the mysteries of past irregularities under what seemed to be identical conditions, so that they were able to increase the output per hour of the machine by over 100 per cent., with a large reduction per 1000 cubic feet in all materials used. The greatest single factor in improving the work was in the manipulation of the generator fire—in which almost the whole art of water-gas making lies in regulating the generator fire. This part of the plant was found far more sensitive than had been imagined—so much so, that it was not practicable to operate the set by hand to the best advantage.

It is not, the author continued, practicable, under ordinary conditions, to operate a water-gas set on a cycle shorter than six minutes; this cycle usually taking two minutes for blowing and four minutes for running. Better results can usually be obtained by shortening the cycle, the proper length of which must be determined for each kind of fuel. But such shortening of the cycle is impracticable by hand work, because of the physical strain on the gas maker. Having the plant already equipped with air-pressure service, it seemed as if this splendid servant might be made to do the gas-maker's part of the work, and with much more regularity. We set about developing this thought; and after much consideration and experimenting we evolved a simple, and comparatively inexpensive device that perfectly operates the set automatically.

In the first place, all valves except one are closed by gravity. This one exception is the hot valve; there being too much friction in its mechanism to permit of operating one way by gravity. So two cylinders were provided—one to open the valve, the other to close it. The reverse movement of the valves is accomplished by a cylinder and piston set under the valve-handle lever, operated by a water pressure under the piston, which holds the valve open the required length of time, when the pressure is released and the piston descends, closing the valve.

As air pressure is the motive power for operating the valves, and as the valves might stick to their seats when closed, an elastic medium like compressed air acting directly on the valve-lifting pistons would, no doubt, cause serious disaster to the valve and connections if the valve did stick and then suddenly let go. To overcome this danger, a hydraulic system is employed, consisting of a piece of 4-inch pipe from 12 to 48 inches long [as necessary to contain a sufficient quantity of water] in each air-line between the air control and the valve cylinder. The air entering the top of one of these water containers or cylinders forces the water out at the bottom and into the valve cylinder. Between the water container and the valve cylinder is interposed a swing check-valve set, to close against the flow of water toward the valve cylinder. A small hole drilled in this valve permits the water under pressure to slowly fill the valve cylinder, and this slowly opens the valve. The size of the orifice in the swing-check deter-

mines the speed of opening of the valve on the set; and with the air pressure released, the check-valve swings open, and the water quickly flows back from the valve cylinder to the water container, thus causing rapid closing of the valves on the set.

Air pressure to the water cylinders is controlled by specially designed balanced piston air-valves, operated by a series of cams on a shaft that makes one revolution per gas-making cycle. The adjustment of the cams, to obtain the desired sequence of the operation of the valves on the set, is accomplished by fingers on each end of the cam disc, which are adjustable and held at any desired point by a bolt-and-wing nut. The cam-shaft is rotated by clock mechanism and a pendulum, operated by a weight. A safety device is designed to prevent the racing of the cam-shaft in the event of breakage of any part of the clock-train or pendulum mechanism. Fingers on the safety device would be thrown outward by centrifugal force, and engage the shaft.

The design of the apparatus is such that if any accident happens to the air-pressure supply all valves would close, either when blowing or when a run was on, and the plant would come to rest in a safe condition. As all valves close when the air is cut off, and stay closed, disaster cannot happen from this cause. The apparatus has been in continuous operation since September, 1913; and, with the exception of minor troubles, mostly in the packings of the valve-cylinder pistons, it has been found exceedingly reliable and dependable. Objection has been made against the device because there is not a positive closing of the valves, and in some cases closing by gravity might be uncertain, and therefore dangerous. Experience has not shown any such danger, but rather that gravity is a very safe and dependable power; nor is there danger in practical working of foreign matter accumulating under a valve-disc that requires crushing in order to set the valve. However, a positive closing of the valve may be accomplished by superimposing a second cylinder and piston upon the one that opens the valve.

The author finds the best cycle for even the highest grade coke to be four minutes—consisting of about 90 seconds blow and 150 seconds run. Coaling-up is done every fifth run (or 20 minutes) and the fire is cleaned every fourth coaling—80 minutes.

CHEMICAL CONTROL OF PURIFIERS.

The following is an abstract translation of an article in the "Journal für Gasbeleuchtung" by Mr. C. J. H. Madsen, Chemist at the East Gas-Works, Copenhagen, on the importance of chemical control in the working of purifiers.

The author points out that the time for changing purifying material is generally determined by the use of moist lead paper, but that a more rational procedure is to be guided by determinations by gas analysis of the sulphuretted hydrogen at the outlet of the different purifiers. A rapid and convenient method of making such determinations he proceeds to describe. The advantage of this method of control is that there is less risk of the oxide being changed before it is actually necessary.

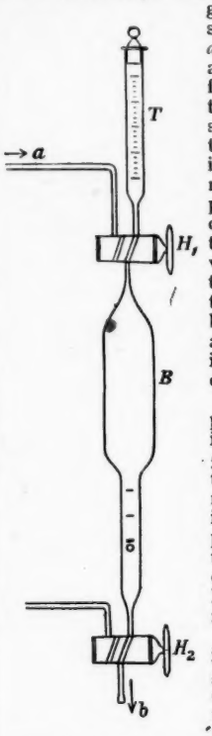
He uses as an illustration of his procedure the working in the No. 2 purifying-house at the East Gas-Works at Copenhagen, where four purifiers are worked in series, and daily about seven o'clock in the morning the order of working is changed—the vessel which was last in rotation being put first. The object of this method of working (which was introduced there in 1910) is to use up the oxide more completely. The vessels in turn take up sulphuretted hydrogen when in the first position, and then the oxide is revivified *in situ* when the vessel is in the last position. As a rule, the last two vessels are both "clean" to lead paper. With the method of working adopted the oxide is found to be spent after being changed twice or thrice, so that considerable economy is effected in wages for filling and emptying the vessels and turning the oxide during revivification. Sets of three vessels with a centre valve could be worked in the same manner; but in that case, as a rule, only one vessel would be "clean."

The author gives tables showing the proportion of sulphuretted hydrogen on different days at the inlet and outlet of each vessel in the series. The following figures taken from the table show the percentage of sulphuretted hydrogen on successive days with the same vessel and oxide as it changes its position from first to last in the series: First day, No. 1 position, inlet 1·64 per cent., outlet 0·21; second day, No. 2 position, inlet 0·12, outlet 0·06; third day, No. 3 position, inlet 0·05, outlet *nil;* fourth day, No. 4 position, inlet *nil*, outlet *nil*. The example quoted is for the least efficient charge of oxide in the four vessels at the time. The oxide in one of the other vessels when in the No. 1 position reduced the sulphuretted hydrogen to 0·07 per cent. The oxide for which the figures are given had been in use for ten weeks, and would be the first of the four to be changed. A month later this same vessel and oxide were doing less satisfactory work, the percentage of sulphuretted at the outlet when it was in the No. 1 position being 0·40. It still showed "clean" gas at the outlet when in the No. 3 position, but the opportunity was taken to change it after it had been in continuous use for 3 months 21 days. When removed it contained 30·4 per cent. of sulphur, reckoned on the dry material. It was very hard when taken out; and had it not been for this it might have continued in use considerably longer.

Other examples are given to illustrate how the analytical data of the proportion of sulphuretted hydrogen at the inlet and outlet of each vessel may be used to indicate how long a vessel may safely be retained in use without changing the oxide. When the oxide in the second vessel does not take up so much sulphuretted hydrogen that the third vessel can remove all that is left, the work is being carried on with one "clean" vessel, and it would appear then necessary to change the material in the second vessel.

The author next gives a table showing the number of times the oxide was changed during the years 1912 to 1914, when working with a daily change of rotation of the vessels, and during the years 1908-9, when the position of the vessels remained unaltered in the interval between two changes, the gas coming first in contact with the more foul, and secondly in contact with the less foul material. These figures show that vessels were changed in the eight months from April to November inclusive 79 times in 1908, 70 times in 1909, 44 times in 1912, 45 times in 1913, and 16 times in 1914—the make of gas not varying very greatly in this period in the different years. During 1912-13, the daily change of rotation with admission of air to the vessels was adopted, but analytical control of the working was not brought into use until 1914. The adoption of a system of analytical control reduced the number of changes of the oxide to 0·9 per 1000 million cubic feet of gas purified; whereas in 1912-13 the number averaged 2·7, and in 1908-9, under the old method, it averaged 4·5 per 1000 million cubic feet of gas. The economy of working under chemical control is evident from these figures. English coal only was carbonized, and the proportion of Prussian blue in the spent oxide, containing about 18 per cent. of moisture, varied from 8 to 10 per cent.

The illustration shows the form of burette which the author has used for sulphuretted hydrogen determinations. To fill the gas burette, the taps H_1 and H_2 are turned so that the gas flows in the direction from *a* to *b*. When the burette has been filled and the taps H_1 and H_2 closed, water is forced up by means of a levelling vessel through the tap H_2 to the zero mark—the surplus gas being expelled through *a*. With the tap H_1 shut, the water in the burette is sucked out to a level below the zero mark through the tap H_2. The reduced pressure in the burette allows of a few drops of starch solution being admitted through *b* and the tap H_2. With a slight vacuum in the burette, a standard solution of iodine is run in drop by drop from the titrating burette T, the whole burette being agitated between each drop. When a blue coloration persists, the quantity of iodine solution run in is read off. This completes the analysis.



The standard solution of iodine is prepared by dissolving 1·06 grammes of pure iodine in a litre of distilled water, adding 5 grammes of potassium iodide to promote the solution of the iodine. The solution must not be warmed. Of this standard iodine solution, 1 c.c. corresponds with 0·1 per cent. of sulphuretted hydrogen. As the titration burette is divided into tenths of a c.c., the proportion of sulphuretted hydrogen in the gas can be readily determined within 0·01 per cent. by volume.

The starch solution which is used as indicator is made by dissolving three grammes of pure soluble starch in 200 c.c. of water, with careful warming and stirring, but without boiling. The chemical reaction between the iodine and the sulphuretted hydrogen is shown by the equation $H_2S + I_2 = 2HI + S$. When there is no more sulphuretted hydrogen to saturate the free iodine admitted to the gas-burette, the excess of free iodine colours the starch solution blue.

FORMATION OF AMMONIA AND CYANOGEN DURING THE CARBONIZATION OF COAL.

The process of the formation of ammonia and cyanogen during the carbonization of coal is dealt with by Professor O. Simmersbach, in the report of the German Coke-Oven Committee.

The investigations have been made in a complete experimental laboratory plant. The heating of the carbonizing tube is by electricity, so that, by variation of resistance, the temperature may be exactly regulated. For the absorption of ammonia and cyanogen, the generally used dilute sulphuric acid and alkaline solution of ferrous sulphate are taken. The tar is condensed in a tube with cotton wool, and is afterwards washed out by chloroform. From the chloroform solution the ammonia is extracted, by shaking it with dilute sulphuric acid. Before starting the operation, air is removed from the plant by means of carbon dioxide; and at the end of the carbonization, the last particles of gas are driven out in a stream of pure nitrogen.

The estimation of ammonia, of course, gives no trouble at all. Cyanogen is estimated in the alkaline ferrous mixture by the Feld

method [distillation with magnesium chloride and mercury bichloride, and titration of the distillate with deci-normal solution of silver]. More trouble is given by the estimation of nitrogen in the coke, as this is generally not readily accessible to chemical agents.

The common Kjeldahl method is of no use here; and therefore it has been modified in the following way. In a conical Jena flask of 750 ccm., 1·5 or 2 grammes of finely powdered coke are heated with 75 ccm. of strong sulphuric acid, on an asbestos-gauze in the full gas-flame. The mouth of the flask must be open, so that water vapours are allowed to escape. After half-an-hour's heating, 20 grammes of very thoroughly dried sulphate of potash are added. The heating is continued for two hours, and then 1 gramme of powdered chlorate of potash is added in small portions. When the action goes well, the process is finished when the boiling has been continued an hour after the addition of the chlorate. Of the sulphuric acid there is only one-half of the quantity left; the remainder has been decomposed or evaporated. After cooling, water is added, and then the flask is connected to a distilling apparatus. This done, caustic soda solution is added in small quantities through a tap-funnel. The ammonia is caught in a ten-bulb tube with a measured volume of deci-normal acid. In this way, the destruction of the coke is complete; and accurate figures are obtained.

From a great number of figures, the following results may be quoted.

Distribution of Nitrogen.

Silesian Coal with 6·63 per Cent. Ash and 1·396 per Cent. Nitrogen.

[In the tables, 1·396 nitrogen = 100.]

Carbonization Temp. Deg. C	Nitrogen in Ammonia. Per Cent.	Nitrogen in Cyanogen. Per Cent.	Nitrogen in Tar. Per Cent.	Free Nitrogen in Gas. Per Cent.	Nitrogen in Coke. Per Cent.
600	7·81	0·25	2·12	18·13	71·69
700	18·13	0·66	3·65	12·13	65·43
800	21·28	0·87	3·47	10·73	63 65
850	23·68	1·11	3·72	10·37	61·12
900	24·12	1·19	4·15	12·14	58·40
1000	23·15	1·23	4·11	21·53	49·98
1100	23·09	1 31	3·70	30·51	41·39
1200	22·84	1·42	4·21	45·10	26·43

Westphalian Coal with 5·7 per Cent. Ash and 1·391 per Cent. Nitrogen.

800	19·46	0·76	1·92	5·88	71·98
850	22·14	1·10	1·77	4·93	70·06
900	19·94	1·11	1·61	9·99	67·35
1000	19·61	1·25	1·87	21·54	55·73

The temperature for the maximum formation of ammonia seems to be at about 900° C. The amount of cyanogen rises with the temperature; and it appears that at 1200° C. the maximum is not attained. The Westphalian coal has a lower temperature for the maximum production of ammonia than the Silesian coal; the figure being 850° C. for the former, as against 900° C. for the latter.

The author gives also a tabulated summary showing the production of sulphate to be expected at different temperatures.

Silesian Coal (1·396 per Cent. Nitrogen).

Temperature. Deg. C.	Total Nitrogen in Coke.	Production of Sulphate Per Cent. of Dry Coal.
600	1·273	0·515
700	1·218	1·194
800	1 205	1·401
850	1 187	1·562
900	1·139	1·588
1000	0·997	1·525
1100	0·830	1·520
1200	0·529	1·504

Westphalian Coal (1·391 per Cent. Nitrogen).

800	1·275	1·277
850	1·243	1·453
900	1·204	1·309
1000	1·091	1·288

As a sequel to these experiments, there was investigated the possible destruction of ammonia when in contact with red-hot coke. For this purpose, perfectly dry ammonia gas was passed through a glazed porcelain tube filled with small coke. For measuring the temperature, there was in the centre of the coke layer a thermopile couple. The action in the tube leads, on the one hand, to the formation of hydrocyanic acid, and, on the other, to the destruction of ammonia into gaseous nitrogen and hydrogen. All are estimated in the usual manner.

Temperature of the Coke. Deg. C.	Duration of the Action between Coke and Ammonia. Seconds.	Quantity of Ammonia Remaining Intact. Per Cent.
700	0·66	76·16
700	1·68	56·95
700	3·44	37·75
700	3 75	62·48 (wet ammonia)
750	1·05	63·48
750	1·70	48·59

From the various experiments, the following conclusions are drawn, all of which have long been known.

1.—The formation of ammonia occurs chiefly at a temperature where the caking of the coal has been completed.

2.—The formation of ammonia has its maximum at different temperatures for different coals.

3.—This maximum temperature varies with the nature of the nitrogen compounds in the coal, and is between 800° and 900° C.

4.—The decomposition of ammonia in a concentrated gaseous state begins obviously at a temperature of 750° C., and is almost complete at about 800° C. But owing to its dilution with other gases, the destruction of ammonia in the carbonization of coal starts at about 900° C., and is increased with rising temperature.

5.—The formation of cyanogen increases with the quantity of ammonia and with the rise in temperature.

6.—The quantity of cyanogen formed in the destructive distillation of coal is about 1·2 per cent. of the total nitrogen in the coal, and about 5 per cent. of the total ammonia.

7.—Water vapour lowers the amount of cyanogen, but is favourable for the yield of ammonia.

8.—High speed of the flow of gas retards the decomposition of ammonia, and increases the formation of cyanogen.

9.—The dimensions of the pieces of coal have no influence on the formation of ammonia.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Institution of Gas Engineers "Roll of Honour."

SIR,—For insertion in the next volume of "Transactions" a list is being prepared of members of the Institution of Gas Engineers who are serving in His Majesty's Forces.

Will you allow me to ask the assistance of your readers in compiling this list; so that it may be made as complete as possible.

If they will send me the names of any honorary members, members, associate members, associates, or students they may know of who have joined the colours, with particulars of rank and the regiment in which they are serving, &c., the information will be much appreciated.

WALTER T. DUNN, Secretary.

39, *Victoria Street, S.W.*,
July 28, 1915.

Production of Toluene.

SIR,—In your "Editorial" on p. 114 of the issue of the "JOURNAL" for July 20, regarding "Market Value of Light Oils and Other Constituents of Tar," you ask for further information as to the extent to which the composition and stability of the gas are interfered with.

Might I suggest it would also be an opportune time, when almost all gas-works are putting in use the tar-washing process for the extraction of toluene, to inquire what effect (approximately) per gallon, pint, or gill of toluene extracted over and above the normal contents, will this process have on the volume of the gaseous products per ton of coal carbonized.

Normally, 1 ton of untreated tar contains 0.75 to 1 gallon of toluene, while by tar-washing treatment this can be increased to 3½ to 4 gallons. Assuming it takes 18 tons of coal to produce 1 ton of tar, then 1 ton of coal furnishes (say) 3 gills of toluene.

The chemical formula of toluene is C_7H_8; and if these gaseous compounds are transferred to the tar, what are the effects produced on the gaseous products in volume, calorific, and illuminating power?

T. W.

July 29, 1915.

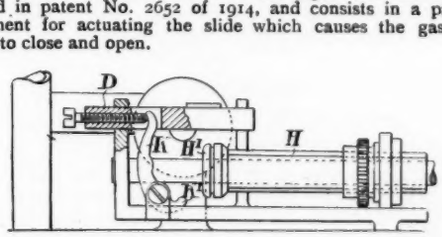
REGISTER OF PATENTS.

Prepayment Gas-Meters.

JULIUS PINTSCH, of Vienna.

No. 3216; Feb. 6, 1914. Convention date, April 22, 1913.

This invention relates to a further development of the invention described in patent No. 2652 of 1914, and consists in a particular arrangement for actuating the slide which causes the gas cut-off member to close and open.



Julius Pintsch Company's Prepayment Gas-Meter.

According to the earlier patent, the slide, which by its movement at the end of the gas delivery period puts under tension a spring, is returned into its initial position by the spring on the insertion of a coin, whereby the gas-valve is opened. The employment of a spring is said to be open to the objection that, owing to the decrease of its tension occurring after some time, its effect varies and so impairs the uniform action of the apparatus. This inconvenience is, it is claimed, obviated by the present invention, which provides for a "perfectly positive and simple actuation of the slide."

The engraving shows an embodiment of the invention. The sleeve H is provided with a cylindrical head H^1 the bottom part of which is

conical in shape. The arm K is constructed as a two-armed lever—the shorter arm K^1 being hook shaped. The arrangement is such that when the valve is open the head of the sleeve moving to the left may freely pass over the hook without turning the lever K K^1. At the end of the gas-delivery period, the head of the sleeve strikes against the long arm K of the lever and causes the gas-valve to be closed suddenly, by shifting the slide D; and the hooked arm of the lever is turned so as to abut against the conical part of the head of the sleeve. If, now, a coin is inserted, the sleeve moves again to the right, and its head turns the lever K K^1 as the hook slides along it. Thereby the slide is thus pushed to the right, and the valve opened.

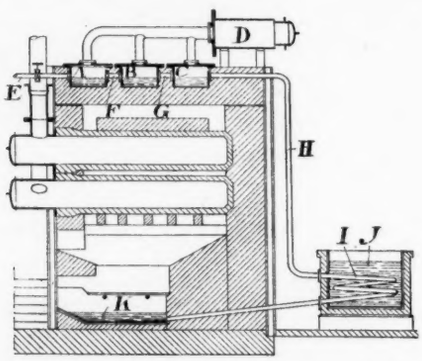
Treating Gas Liquor in Small Gas-Works.

BERLIN-ANHALTISCHE MASCHINENBAU-ACTIEN-GESELLSCHAFT, of Berlin.

No. 4243; Feb. 18, 1914. Convention date, Oct. 21, 1913.

This invention is a modification of the method of treating the gas liquor in small gas-works that was described in patent No. 4242 of 1914.

The "vigorous heating of the ammoniacal liquor, by means of which the ammonia contained in the ammoniacal liquor is completely driven off," is effected by arranging a plurality of evaporating vessels in series in the top course of the brickwork of the retort-furnaces. With this arrangement the cold, or slightly preliminarily heated, crude gas liquor flows to the first evaporating vessel in which it is warmed; while a portion of the volatile ammonia gases escapes. The warm ammoniacal liquor then enters a second evaporating vessel, which is also arranged in the top course of the retort-furnace, in which vessel it is vigorously heated, so that further quantities of the volatile ammonia contained in the liquor are driven off. The highly heated ammoniacal liquor then enters a third vessel; and, if necessary, additional vessels arranged in the top course of the furnaces are employed—heated to increasing temperatures "until finally the whole of the volatile ammonia contained in the ammoniacal liquor is eliminated."



A "Bamag" Liquor Apparatus for Small Works.

An installation for the treatment of the crude ammoniacal liquor in accordance with the invention is illustrated in section—with three evaporating vessels.

In the top course of the setting of the retorts evaporating vessels A B C are arranged—each closed by a cover. The volatile ammonia expelled from the crude liquor in the vessels by heating flows through conduits to the condenser D. The crude liquor, which may be preliminarily heated by flowing round the condenser (as indicated in the earlier specification referred to), flows through the conduit E into the evaporating vessel A. The ammoniacal liquor which has already been deprived of a portion of its ammonia vapours, issues from A and passes through the conduit F into the evaporating vessel B. Here it is further heated and yields up an additional proportion of its volatile constituents. It thence flows through the conduit G into the evaporating vessel C, in which "it is so highly heated that the whole of the volatile constituents are expelled." The water which flows out of the vessel C through the conduit H then passes through a coil I heating the acid bath J, and then enters the hearth K of the retort-furnace.

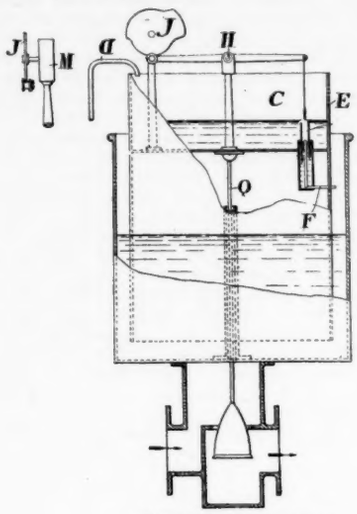
Gas-Governors.

EDWARDS, A. D., of Garston, near Liverpool.

No. 15,320; June 26, 1914.

This invention relates to gas-governors provided with means for automatically varying the load at certain times, so that the gas pressure may be kept substantially constant.

In the form illustrated, in order to utilize the principle of varying loading by varying the quantity of water entrapped from a constantly flowing stream, the governor bell is provided with an upper chamber C, to which water is constantly supplied by a pipe D, overflowing therefrom by pipes E F, which are relatively movable. The pipe E is carried from one end of a lever pivoted at H the other end carrying a roller in contact with the cam J, "which is shaped according to the polar curve of pressure with relation to time generally obtaining in the district to supply the pressure which it is desired to govern." The pipe F is surrounded for part of its length by the pipe E, which, in turn, is surrounded by K—mercury being supplied to form a seal between the pipes E and F. The disc J is rotated by clockwork M carried on a spindle. The division plate between the top and bottom parts of the governor bell also carries a rod Q passing through a sleeve and having mounted at the bottom end a valve S, controlling the passage in the gas outflow pipe.



Edwards' Gas-Governor.

In operation, as the disc J is rotated so the left end of the lever is raised or depressed, being kept in contact with the disc by the weight of the pipe E at the other end of the lever, and which end, together with the pipe E, is therefore correspondingly lowered or raised so that the liquid level in the tank C is lowered or raised, and so the loading on the governor bell is changed, and pressure automatically varied as desired.

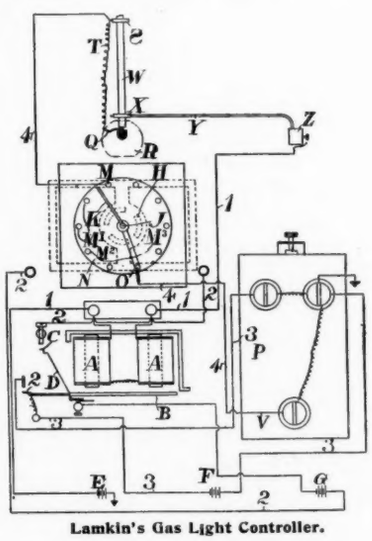
In cases where an intermittent change has to be made—such as the change for an extra cooking load on Sunday—a further cam disc is placed on the same shaft as the disc J, to only deal with the particular hours it is desired to vary; so that for the greater part of the day the disc J will itself be in operation, but for the remainder the added disc will act.

Controlling and Lighting Gas.

LAMKIN, A. E., of Brighton.

No. 17,170; July 20, 1914.

Apparatus made in accordance with this invention comprises the combination of a terminal of a spark-gap mounted on the enclosing globe or chimney of each burner and two electric circuits closed by a relay, one of which closes the primary coil of an induction coil, while the other operates a motor adapted to close a series of wiping-contacts and place each of the circuits to the burners and spark-gaps in circuit with the secondary coil of an induction coil. Four electric circuits are consequently employed: (1) Adapted to be closed manually through a relay; (2) adapted to be closed by the relay circuit through a motor which is adapted to rotate an armature which carries a switch arm over wiping contacts; (3) the primary circuit of the induction coil; (4) a circuit through the secondary coil of the induction coil and through each of the circuits to the burners closed by the switch-arm rotated by the motor.



Lamkin's Gas Light Controller.

A diagram is given of apparatus and electric circuits of one form of the apparatus—the circuits referred to being numbered 1, 2, 3, 4.

A are the electro magnets of a relay; B is the armature of the magnets carrying make-and-break contacts C D. E, F, G are batteries. H is a motor having a spindle J carrying a finger K adapted to make wiping-contact with nine terminals M, M^1, &c., on the dial N, each of

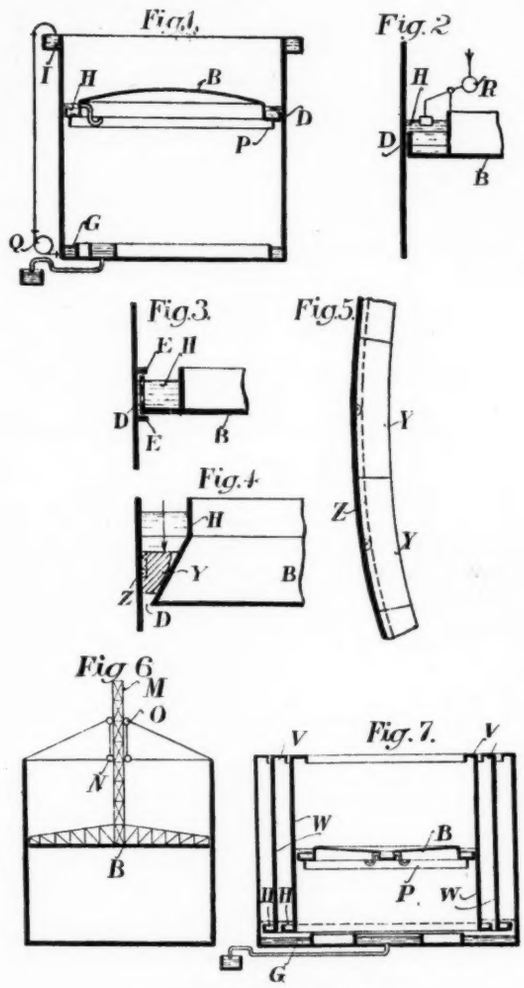
which is connected to a separate burner. O is a terminal on the dial in the circuit 4, and electrically connected to the finger K. P is an induction coil. Q is one terminal of the spark gap mounted on the globe R, and connected to the terminal on the induction coil through the wire T supported by the insulated block S and through the conductor V, and back through the standard W to earth. X is a gas-cock connected by a pipe Y to the pneumatic plunger Z, by which it is adapted to be operated in any known manner. These valves are placed where separate control is required. An electrical switch is adapted to close the circuit 1 through the electro magnet A of the relay. This switch may be operated by the plunger in being moved to open the gas-valve, or the switch may be operated independently of the plunger.

Gasholders.

MASCHINENFABRIK AUGSBURG-NÜRNBERG, A. G., of Nuremberg, Germany.

No. 16,184; July 7, 1914. Convention date, Sept. 4, 1913.

This invention relates to a gasholder having a disc-shaped crown and a liquid seal, with the object of rendering it "possible to dispense with the double wall and the deep layer of liquid in the gasholder, and to employ nevertheless a liquid seal."



A Nuremberg Gasholder Patent.

Several ways of carrying the invention into effect are described and illustrated diagrammatically.

Fig. 1 is a sectional elevation of the principal form of the suggested holder, in which moves the disc-like closing member or crown B. Both holder and crown are sealed in relation to each other by the liquid seal H. The sealing liquid flowing down through the clearance space D between the closing member and the wall of the holder is collected in an annular channel G at the bottom of the holder, and forced back by a pump Q into the annular channel I at the upper edge of the holder, whence, by piping, it is conducted back to the sealing channel H. The reservoir G at the bottom of the holder receives the annular part P of the member B, when the latter is in its lowest position, and thus, if necessary, shuts off the inner gas space from the atmosphere.

The depth of the layer of liquid in the channel H is chosen according to the gas pressure obtaining. If it be intended to keep as small as possible the loss of liquid caused by the clearance D, then it is said to be best so to choose the height of the layer of liquid that the pressure at the bottom is only a little greater than the pressure of the gas, diminished by the adhesive action of the sealing liquid taking place in the clearance D. In order to regulate the quantity of liquid flowing at any time to the channel H and consequently to maintain the liquid in it at the correct level, a float can be arranged which, as shown in fig. 2, acts on a valve R in the supply pipe for the liquid.

In order to reduce the loss of liquid in the sealing device, one of a series of measures can be resorted to, as represented in figs. 3, 4, and 5. Fig. 3 shows the employment of packing strips, consisting of jute E. In figs. 4 and 5 an arrangement is shown in which separate sliding pieces Y, of wedge-shaped section, effect the sealing. The pieces are flexible, so that they automatically follow all deviations of shape occurring in the wall of the holder, and thus reduce to a minimum the clearance space D, even when in motion. In this connection, in order to ensure that there is always a film of liquid between the packing and wall, grooves Z are provided, which communicate with the sealing liquid by channels.

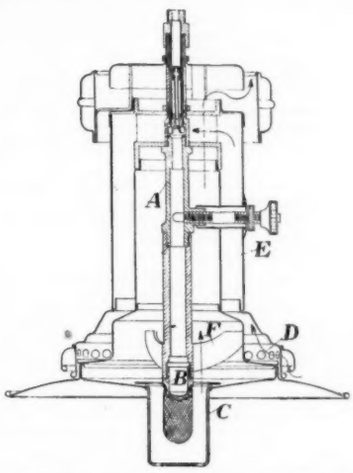
Figs. 6 and 7 show the general arrangement of holders "designed on the improved system." In order to ensure a more reliable guiding of the closing member B and at the same time slight play in the sealing, it is, in fig. 6, provided with a strong guiding pillar M consisting of iron-work, which rests against the guide rollers N O secured in the truss-work of the roof. Fig. 7 shows that the sealing system described can be employed also for telescopic gasholders. In such cases the design of the liquid seal with the reservoir can, without alteration, be applied to the telescopic jackets W. In the construction shown, all the movable members are formed with external cut flanges (to contain liquid) which engage with similar internal cup flanges V formed at the upper ends of the telescopic members and at the upper end of the external casing.

Compressed-Gas Lamps.

EHRICH AND GRAETZ COMPANY, of Berlin.

No. 16,132; July 6, 1914. Convention date, July 31, 1913.

This invention relates to a compressed-gas lamp for inverted incandescent gas lighting, in which the mixing air is heated before its admission into the mixing pipe, and a cylinder (preferably of quartz) closely surrounds the incandescent mantle.



A German Form of Compressed-Gas Lamp.

In the construction shown, the gas escaping from the nozzle into the mixing pipe A draws through openings above the desired quantity of air. The resulting mixture burns at B, which is connected to an incandescent mantle closely surrounded by the cylinder C, preferably of quartz. Fresh air is admitted through a series of openings D into the chamber E, rises upwards in the direction of the arrows, and passes through two pipes leading through the chimney to the air suction openings of the burner. A set-screw is used to regulate the proportion of air drawn in. The pipe A is provided at its lower end with ribs F resting against the lower portion of the inner wall of the chamber E. The heat radiated by the burner head or lower portion of the mixing pipe is, therefore, transmitted to the preliminary heating chamber, and the process already described takes place.

APPLICATIONS FOR LETTERS PATENT.

10,552.—SCOTT, W. G., "Shade holder." July 20.
10,621.—TSUDA, G., "Gas-meters." July 21.
10,724.—BAKER, G. S., and KEITH, J. & G., "Ovens for bread." July 23.
10,766.—PEASE, E. L., "Burning of combustible fluid mixtures." July 24.

Gas Matters at Chelmsford.—At the monthly meeting of the Chelmsford Town Council last Wednesday, it was officially reported that the Chelmsford Corporation Gas Act, 1915, has now received the Royal Assent. It was also intimated that a new gasholder would shortly be required; and the Gas Committee recommended the Council to agree to the Gas Company accepting a tender by Messrs. C. & W. Walker, Limited, of Donnington, to erect a new gasholder, of a capacity of 400,000 cubic feet, for £10,100. The Committee further recommended that the costs be defrayed by means of a loan from Messrs. Barclay and Co., subject to the amount being repaid twelve months after the termination of the war or at any earlier date at the option of the Corporation. The Mayor stated that Messrs. Barclay were originally prepared to lend the money at 5 per cent. interest, but had since agreed to reduce the rate to 4½ per cent. The proposal was adopted.

PARLIAMENTARY INTELLIGENCE.

BILLS ROYAL ASSENTED.

The following Bills received the Royal Assent:

Ashington Urban District Council.
Barnoldswick Water.
Dewsbury Corporation.
Gas and Water Provisional Orders (No. 1).
Gas and Water Provisional Orders (No. 2).
Gas and Water Provisional Orders (No. 3).
Glasgow Corporation Orders Confirmation.
Lincoln Corporation.
Metropolitan Water Board.
Plymouth Corporation.
Port Glasgow Gas.
Price of Coal (Limitation).
Rhondda Urban District Council.
Southend Water.
South Staffordshire Water.
Weardale and Consett Water.
Wolverhampton Water.

Gas Undertakings Returns.

The Board of Trade returns relating to gas undertakings (local authorities and companies) were presented in the House of Commons on Monday last week and ordered to be printed.

Gas-Works and the Munitions Act.

Mr. W. THORNE, on Monday of last week, asked the Minister of Munitions whether gas-works, in consequence of manufacturing chemicals for high explosive shells, are, or may be, made subject to the Munitions of War Act; and whether any difference between gas-works' employees and the management would come within the scope of Part I. of the Act or be made the subject of proclamation.

Dr. ADDISON: Part I. of the Munitions of War Act can be applied by proclamation to any difference between employers and workmen which, in the opinion of His Majesty, is directly or indirectly prejudicial to the manufacture, transport, or supply of munitions of war. This is clearly wide enough to cover differences affecting the employees in question.

Mr. THORNE: Do gas-works, in consequence of making these chemicals, come under the Munitions of War Act?

Dr. ADDISON: At the present time they are not being declared controlled establishments.

German Factories in Holland.

Mr. AGG-GARDNER, later on, asked the President of the Board of Trade whether the Act prohibiting trading with the enemy is being evaded by the establishment of German factories in Holland which—such as the Gautsch Incandescent Light Company, a branch of a German firm working with German capital, at Sloterdyk, near Amsterdam—flood the British market with their produce; and, if so, whether any steps will be taken to make the Act more effective.

Mr. RUNCIMAN: Goods (with certain minor exceptions) cannot be imported into this country from Holland unless accompanied by a certificate of origin issued by a British Consul. Such certificates are not granted in cases where the manufacturing firm is known to be a branch in Holland of an enemy firm. I shall be glad to consider any information respecting the particular firm referred to.

PRICE OF COAL (LIMITATION) BILL.

Bill Passes through Both Houses.

The Bill [*ante*, pp. 137, 197] to provide for the limitation of the price of coal at the pit head, presented by Mr. Runciman, passed through its remaining stages in the House of Commons last Tuesday. When the Bill as amended was brought up for consideration, the debate, for the most part, was in reference to household coal.

Sir EDWIN CORNWALL, in this connection, said he thought the leading coal merchants would be well advised if, after the debates in the House, and after public attention had been drawn to the matter, they undertook the responsibility of going to the various poor districts of London, and setting up in each of them some establishment under their own control where poor persons who had to buy small quantities of coal could do so without the cost of the trolley-men's wages and other items which belonged to the ordinary sales.

It was next agreed that sub-section 1 of clause 1 should be amended so as to read: "Coal at the pit's mouth shall not be sold or offered for sale directly or indirectly by the owner," &c.; it being pointed out that a sale indirectly to a second person would naturally lead to an evasion of the Act.

Similarly, sub-section 1 of clause 3 was amended so as to read: "If in any proceedings any question is raised as to the corresponding price of any coal, or as to the cost of railway or other incidental services, or as to the sums charged for the use or provision of trucks, the Court shall refer the question for determination by the Board of Trade."

PROVISION FOR CONTRACTS.

Mr. RUNCIMAN, as promised, submitted the following provision with regard to contracts, which he moved should be added at the end of sub-section 2 of clause 3.

> "Provided that where any contract has been made on or after the first day of April, 1915, and before the commencement of this Act, for the sale of coal by the owner thereof at the pit's mouth, coal delivered under that contract after the expiration of the period fixed under this provision, and shown to be excepted coal within the meaning of this provision, shall, if the other party to the contract within two months after the commencement of this Act gives notice in writing to that effect to the owner of the coal at the pit's mouth, be deemed for the purposes of this Act to be sold at the time of the delivery thereof.
>
> "If in consequence of this provision the price to be paid by any person to whom coal is delivered is reduced by any amount, the price to be paid by any person to whom the coal is delivered in pursuance of any subsidiary contract shall be reduced by an equivalent amount. [Afterwards added: "and any purchaser under any such subsidiary contract shall have the same right to give notice to the owner of the coal at the pit's mouth as the person who has made the original contract with that owner, and any person who has sold the coal shall, if required, communicate to the purchaser the name of the person from whom the coal has been bought."]
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> "For the purposes of this provision 'excepted coal' means coal supplied for domestic or household purposes to any person and coal supplied for any purpose to any local authority, or to any undertakers supplying gas, water, or electricity in any locality in pursuance of authority given by an Act of Parliament, or by an Order confirmed by, or having the effect of, an Act.
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> "The period fixed under this provision shall be a period of three months after the commencement of this Act; but the owner of the coal at the pit's mouth may apply to the Board of Trade for an extension of that period, and the Board of Trade may, if they are satisfied that there are special reasons in the case in question for such an extension, extend the period for such time as they think just under the circumstances, and the period as so extended shall in such a case be the period fixed under this provision."

Of various amendments proposed, all were negatived, save the one (which was accepted) for the insertion of the words shown in brackets at the end of the second paragraph.

The Bill was then read the third time and passed.

In the House of Lords, on the following (Wednesday) night, it passed through all stages.

LEGAL INTELLIGENCE.

CHARGES AGAINST FORMER GAS OFFICIALS.

Accounts of the Walton-on-Thames and Weybridge Gas Company. Acquittal of the Secretary.

CENTRAL CRIMINAL COURT.—Monday, July 26.

(*Before the* RECORDER OF LONDON *and a* JURY.)

Thomas Henry Lamb, late Secretary of the Walton-on-Thames and Weybridge Gas Company, was on trial on a charge of feloniously stealing certain sums of money—£100 8s. 8d., £17 10s., and £99 7s. 4d.—belonging to the Company. George Waters Ross, late Chief Clerk and Collector of the Company, who was charged with him, had pleaded "Guilty." The first portion of the proceedings was reported in last week's issue of the "JOURNAL" [pp. 200-2].

Mr. W. H. MORESBY (instructed by Mr. W. L. J. CROSBY) prosecuted. Mr. ERNEST E. WILD, K.C., and Mr. A. S. COMYNS CARR defended Lamb; and Mr. DAVID WHITE appeared for Ross. The Solicitors for the defence were Messrs. WHITE AND CO.

George Waters Ross, on following Lamb in the witness-box to give evidence for the defence, was examined by Mr. COMYNS CARR, and stated that he had the handling of all cash out and in. He was sixteen years old when he joined the Company about 23 years ago. As far as he knew, from beginning to end, the defendant Lamb had no knowledge of these frauds, which had been going on for twelve years. He remembered having a conversation with Lamb towards the end of 1913. Lamb then asked witness if he could borrow some money for him on the security of an endowment policy. Lamb said he wanted £100. Witness promised to see what he could do, and next day told him his wife had come into some money, and he could arrange to let him have what he wanted. As a matter of fact, she had not come into any money. Every penny of what he gave Lamb was the money of the Company; but Lamb was not told this until Sept. 23. Witness asked Mr. Price if he could have a fortnight to find the money, when the defalcation was discovered. At first, he told the Directors, when asked for an explanation, that Lamb had had the money.

Cross-examined: Lamb had free access to all the books in the office. He was never in fear of Lamb finding out what was going on; for he never paid any attention to the books. All he asked was how the money was coming in. He was not surprised that Lamb, whom he always treated as a superior, should come to him and ask if he knew how he could raise some money. It was true to say he stole the money, and helped Lamb.

The RECORDER: You say Lamb knew nothing about this matter, and yet on Sept. 24 he had been summarily dismissed. Why did you not at once say to the Directors, "This man has done nothing at all?"

Witness: I was trying to hide everything then.

Cross-examination continued: He had now a strong feeling against Price. The reason he told the Directors at first that he had "faked" the books and Lamb had had the money, was because he thought the Board might not prosecute Lamb while they would him (witness).

Re-examined: The Auditors even could not have discovered the frauds, unless they got to the root of the whole thing—and this was the receipt counterfoils. He even had a private receipt-book which he carried in his pocket.

Tuesday, July 27.

Rev. *Walter K. Bussell*, Vicar of Walton Parish Church, was the first witness called to-day. He stated that he had known prisoner well for fourteen years, and had always had the very highest opinion of him. So far as he knew, this was the general character enjoyed by Lamb in Walton. Ross had been known to him for twelve years, and also held a high character in the neighbourhood.

The RECORDER remarked that he did not know what use evidence of character would be in the case of Ross, when he had admitted that for the past twelve years he had been systematically defrauding his employers, and falsifying the books so that these frauds should not be discovered. Ross was the most unsatisfactory witness he had heard in that Court during the past fourteen years.

Mrs. *Alice M. Lamb*, wife of the prisoner, was then called, and said that during the last few years she had had to undergo several expensive and serious operations. On Sept. 24, she overheard what took place in the Board-room at the full Directors' meeting; and she repeated the details of the conversation. The question of a prosecution was discussed before Lamb and Ross were called into the room. Her husband all along denied that he knew any more of the matter than he had stated. Later, she heard someone in the room say, "Do you think the boy had any of the money." The reply was, "Well, if he has not had any of the money, he must have known all about it; but it is no use bothering about him, as he is not guaranteed." The question of a prosecution was then referred to, and the Guarantee Society were mentioned—it being decided to leave the matter with them. Some of the Directors, including the Chairman, seemed unwilling to prosecute. She recounted the subsequent interview with Mr. Sherwell at the Guarantee Society's office. Mr. Sherwell told her that the Directors of the Gas Company had just been, and had left the matter in his hands to settle. She said the £500 would be paid on condition that there was no prosecution either by the Society or the Gas Company. Mr. Sherwell replied: "You can rest assured that if you pay this £500 there will be no prosecution." On this representation, she parted with her policy. When the money and policy were handed over, Mr. Sherwell again assured her that he had the full authority of the Gas Company to settle the matter. Her husband asked for a statement in writing to this effect; but Mr. Sherwell replied that it would not be worth the paper it was written upon, and they could take his word that the matter had been left in his hands entirely. To pay this money, she had ruined herself.

Cross-examined: She wrote down the conversations heard by her; but what she wrote was not now in existence, and she did not remember when she wrote it. Apart from the notes, she would never forget the conversations. She did not suggest that either she or her husband had communicated with the Gas Company on the question of whether there would be a prosecution.

Re-examined: She knew her husband deserved to be dismissed, apart from all questions of dishonesty, because he had neglected his work.

This concluded the case for the defence.

Mr. *F. H. Sherwell*, Manager and Secretary of the Guarantee Society, Limited, who appeared on the prosecution's *subpœna*, examined by Mr. MORESBY, produced the fidelity policy taken out by the Gas Company. It was dated May 4, 1892, and insured Lamb in a sum not exceeding £1000 in respect of "fraud or dishonesty." There was a clause, which was now really obsolete, under which, on proceedings being taken by the employer against the insured person, the Society were enabled to carry on a prosecution at their own expense. On Sept. 24, Mr. Bilney wrote to the Society informing them of the defalcations, and claiming the amounts under Lamb's and Ross's policies. In reply, witness sent on to the Gas Company forms of claim to be filled in. On Oct. 1 he wrote to Mr. Bilney asking for the policy belonging to Lamb to be forwarded. He was not sure when he first got knowledge that there was such a policy in existence; but he had requested Lamb to call, and he had done so. The Society at once made a demand upon him to be indemnified. Lamb expressed a desire to meet this demand, and made a statement of his assets. On Oct. 15 he wrote Mr. Bilney: "It is due from me to inform you that the Society have, in consideration of certain payments and the assignment of certain policies, given Lamb a settlement in full discharge."

Mr. MORESBY: Is that the first intimation to the Gas Company of what had taken place?

Witness: Yes. I had no authority from the Gas Company to settle.

The RECORDER: Whatever you did, you acted solely on behalf of the Society you represent?

Witness: I submit that the defendants were not only defaulters, but they were debtors.

Mr. MORESBY: It has been suggested throughout this case that you were acting as agents for the Gas Company in this settlement?

Witness: I had no such authority.

Did you ever state to Lamb or his wife that you had such authority?—Never.

Further examined: When the receipt for the policies and money was given, he was asked to associate the Gas Company with the discharge; and he said he could not do so. On Nov. 23, Mr. Bilney wrote saying Ross had stated at the Police Court that Lamb had paid £500, and he (Ross) had also paid certain sums. Witness replied the following day that the £500 had been accepted by the Society from Lamb in full settlement and discharge of the Society's claim. Many further letters had passed, which were all put in. Mr. Bilney, witness said, was the only Director of the Gas Company he had ever seen. He understood Mr. Bilney to say the Directors had no intention of prosecuting, and was surprised to learn they were doing so. Possibly he told Mr. and Mrs. Lamb he believed the Company were not prosecuting.

The RECORDER: The suggestion is—and it was contained in a registered letter by Mrs. Lamb to you, which you did not answer—that you stated that there would be no prosecution, and that was why the £500 was paid?

Witness: Not at all.

Mr. MORESBY: Why did you not answer the letter?

Witness: I should not answer a letter like that. I should pass it on to our Solicitors.

Was there at any time any bargain between your Society and the Gas Company by which there was to be no prosecution if the money was paid to you by Lamb?—None whatever.

At any time?—None whatever.

Cross examined by Mr. WILD, witness said he could not repeat Mr. Bilney's exact words; but he had no doubt the sense of the words was to lead him to believe the Company were not going to prosecute, and this was no doubt what he led the Lambs to believe.

Mr. WILD: Have you any kind of doubt that, if they had not had a moral undertaking that there would be no prosecution, they would have sold themselves up to find the money, in the way they did?

Witness: I think they would still have done so. I have yet to learn that it is not in the interest of a defendant not to make restitution, even if he is to be prosecuted.

When you received this money, were you not under the belief that no prosecution would take place?—That is so; but it was not a condition to my receiving the money.

Further cross-examined: Under the policy it was true that the Society could force the Company to arrest, and to give evidence, and to take proceedings in any name or names they liked. In other words, the Society had a right to prosecute in the name of the Gas Company—indemnifying them against all charges.

Mr. WILD: I suggest that Mr. Bilney told you of the existence of the endowment policy. Will you swear he did not?

Witness: I cannot swear. He might have done so; but I fancy it may have been the defendant.

Will you tell the Jury what you say passed between you and Mrs. Lamb when she called on you?—I have no recollection.

I suggest you told her you had seen the Company's Directors—or, at all events, a Director?—I cannot swear that I did or did not.

Did you say they had left it entirely in your hands to settle?—Certainly not. I should never have made a remark like that.

Did you tell her if the £500 was paid, they would hear nothing more about the matter?—Certainly not. We had our rights which we should have exercised if they had not satisfied us.

What were your rights?—Civil rights.

The RECORDER: Did you say, "You may rest assured if you pay the £500 there will be no prosecution?"

Witness: No, my Lord.

Did you tell her, as she says: "All I have to do is to ring-up Mr. Bilney, and he is prepared to issue a warrant at any moment, if the Society cannot get the money we want. I am between two fires—my Directors and the Walton Directors. My Directors meet to-morrow?"—Certainly not.

Mr. WILD: Do you remember a single thing you or she said?

Witness: No.

The RECORDER: Did you not know that, under the terms of your policy, you could call on the Gas Company to institute a prosecution?

Witness: It did not occur to me.

Mr. WILD: Would you have paid if it had been a civil matter?

Witness: If it had been a case of fraud or dishonesty, we should have paid, whether there was a prosecution or not.

The RECORDER: The suggestion is you pressed Mr. and Mrs. Lamb to give £500, on the understanding there would be no prosecution?

Witness: It is untrue, my Lord.

Mr. WILD: In a letter to you, Mrs. Lamb said she had paid the £500 only on condition that no proceedings, criminal or otherwise, were taken against her husband?

Witness: I did not tell her so.

Has she told the truth or not? If not, why did you not write and say so? Why did you not answer that letter? It was a registered letter.—I declined to answer the letter—a most improper letter.

The RECORDER: Did you tell her when you saw her on the following day why you had not acknowledged the letter?—I do not think it was mentioned.

Mr. WILD: I suggest that you were bringing pressure—criminal pressure—against these people, guilty or innocent.

Witness was then severely pressed by Mr. WILD as to whether he had told the Lambs that Mr. Bilney had said there would be no prosecution; and finally he replied that it might be taken he did do so.

The RECORDER: Are you quite sure you did not say what I just now referred to, about ringing-up Mr. Bilney to get a warrant?

Witness replied that he was.

A Verdict of "Not Guilty."

The RECORDER: Well, I do not know, I am sure, what the Jury say about this case. I do not know what they meant by the communication they handed me earlier in the day. Gentlemen of the Jury, you have now heard the whole of the evidence, both for the prosecution and the defence; and you have heard also what the last witness had to say. The charge is that the prisoner, being a servant of the Gas Company, feloniously stole the sums of money mentioned in the indictment. It is abundantly clear that these sums were, in fact, stolen; and it is also abundantly proved, if you believe the evidence, that there was extensive falsification of the books of the Company. It has, indeed, been admitted by Ross that he did steal the money and falsify the books. The plea of Ross would not be evidence against the prisoner. The case for the prosecution was that Lamb was acting with Ross, and was conscious of all that was done, and that he, in conjunction with Ross, stole these moneys. The prosecution have to make that out, without reasonable doubt. If you have come to the conclusion—if that is the meaning of the communication you have made—that there is a reasonable doubt as to whether the prosecution have made out that, you may say so. If, on the other hand, you are not of that opinion, we must proceed further with the matter, and finish the case.

After the Jury had consulted for a minute or two in the box, the Foreman announced that they were agreed upon their verdict, which was one of "Not guilty."

Mr. MORESBY: I do not propose to proceed with the other charges.

Formal verdicts of "Not guilty" were then recorded in the other indictment for felony and the misdemeanour indictment for conspiracy.

Sentence upon Ross.

Captain *C. W. Holmes*, Mr. *H. Pullman* (a Director of the Gas Company), and Police Superintendent *W. Marshall* having been called to

speak as to the character of Ross, who had pleaded "Guilty" to the two indictments for felony,

Mr. COMYNS CARR addressed the Court on behalf of the prisoner. He pointed out that while, up to a certain stage, Ross was willing to help himself by trying to shift blame on to the shoulders of the other defendant, the moment the matter became one of prosecution, he took up another attitude altogether. He took the whole blame—and truthfully—upon himself; and it showed that there must be something that was not altogether wrong in the man's character that he should frankly and fully take upon himself responsibility such as this. The Guarantee Society had admitted having had £500 from Lamb; and they had also demanded £150 from Ross. If this man had paid the whole of the £150, he would no doubt have received a similar assurance to that given to Lamb. He did, in fact, pay £115, and so made what restitution he was able.

Ross, on being asked if he had anything to say, remarked that twelve years ago he received from the Company £145 a year, and certain emoluments for overtime amounting to £27. The latter were afterwards cancelled, and replaced by an addition of £15 per annum to his pay. After eighteen years' service, he got a rise of £5 a year.

The RECORDER: You have pleaded guilty to these very serious offences; and by your own admissions in the witness-box, you not only misappropriated large sums the property of your employers, but, in order to hide-up your defalcations, you systematically falsified your books, week after week, month after month, and year after year, for twelve years. In the end, as always happens in these cases, the matter was discovered, in connection with the Clayton cheque, and then, after statements you made, both you and Lamb were summarily dismissed. Lamb was personally responsible for the books, and no doubt was liable to be dismissed in consequence of not looking after you; but by your actions, you led everybody to think you were acting with Lamb in what you did. The effect of this has been that Lamb has been prosecuted, and has had to stand his trial for the offence. What distressed me with reference to your evidence was that you displayed such disregard for the truth. You have admitted, I understand, misappropriating between £700 and £800. Larceny by a servant is always a most serious offence, and it is greatly aggravated when it extends over so long a period of time, and is so skilfully carried out as to deceive even the Auditors. I should be lacking in my duty if I passed on you a less sentence than twelve months' imprisonment with hard labour.

RIVER POLLUTION BY GAS-WORKS.

A Case at Retford.

The Retford Corporation were summoned last week before the Borough Magistrates for causing gas tar and ammoniacal liquor to flow into the Moorgate Beck, which runs into the River Idle, a tributary of the Trent, to such an extent as to kill fish.

Mr. H. MADDOCKS appeared for the Trent Fishery Board; Mr. T. E. ELLISON represented the Corporation.

Mr. MADDOCKS, in opening the case, metioned that the prosecution was taken under the Salmon Fisheries Act, 1861; the maximum penalty being one of £5. The summons related to an offence committed on May 5. The defendants were the owners of the gas-works at Retford; and under the works for a distance of about 50 yards there was a culvert which had its outlet in the Moorgate Beck. The beck flowed into the Idle at a distance of 500 or 600 yards further down. In the afternoon of May 5, a man named Wood and his brother, who were weed-cutters in the employ of the River Idle Fishing Club, were engaged about 1¾ miles below Retford; and they noticed that the fish were greatly agitated. They were darting about here and there as though they were "mad." They also noticed that the water was of a yellowish colour, and smelt very strongly of tar and ammonia. On the following day they saw thousands of dead fish on the bed of the stream. The bed was inspected on May 8, and traces of tar and a yellowish deposit on the bottom and sides for a distance of 500 to 600 yards were found. Not a single live fish was seen below Moorgate Beck for 1¾ miles; while in the reach above the gas-works the fish were apparently all right. On May 15 a visit was paid to the gas-works, and a well was inspected. The contents of the well did not rise; and it was apparent that there was great leakage from the well, which communicated direct with the Moorgate Beck. Therefore, the whole matter was explained. Dead fish were found four miles below the gas-works. All the money that had been spent and all the sport that could be enjoyed had been absolutely swept away by reason of the neglect on the part of the persons having control of the gas-works. He understood that some kind of shadowy excuse was to be put forward—namely, that the Government required the residuals that remained after making gas to be kept for war purposes. How this could affect in any way the turning of the poisonous matter into the stream he was totally at a loss to understand. To put it on the ground of patriotism, was to make patriotism absurd.

Evidence having been given as to the dead fish and the smell of ammonia in the water,

Professor *Percy Frankland*, of Birmingham University, said he had analyzed two samples of the water from the beck, one taken 50 yards and the other 250 yards below the gas-works. The samples were highly polluted liquids containing oily matter and a considerable amount of ammonia, showing that the pollution was caused by gas-works products. He experimented with goldfish. The one he placed in the first sample died in three hours, and the one placed in the other sample died within twenty-four hours.

Professor *R. F. F. Leith*, also of Birmingham University, spoke to examining the samples of water, which disclosed pollution of an extreme character. The gravest ingredients were products from a gas-works. In fact, they could come from no other source.

Mr. ELLISON, for the defence, commented on the fact that no direct evidence had been given as to what had caused the fish to die, or as to the state of the water on May 5; while the samples of the water that had been analyzed were not taken in the presence of anyone connected with the gas-works, nor were they fair samples of the state of the flow of the river on that date. Matters were perfectly satisfactory until the war broke out, when the conditions very materially changed. The Corporation were circularized (as he believed every authority in the kingdom was) by a Government Department, to the effect that crude tar was not to be used on the roads, nor was it to be disposed of to other than tar distillers, who utilized certain of its properties on behalf of the Government. The requirements of the War Office were considered by the Corporation to be even more important at this time than the preservation of fish in the River Idle. If it were true that the liquor got into the beck, it escaped out of the tank without their knowledge or having the means to prevent it. When these conditions arose, the Corporation at once started to build a new tank on up-to-date lines of double the capacity of the old one, in order that during the war they should be able to store more than double the usual quantity of tar and ammoniacal liquor. While the work was in progress, the liquid collected in the old tank to such an extent that it rose above the ordinary level, and to some degree it escaped. In these special circumstances, Counsel submitted that there was nothing the Corporation could do reasonably to avoid it. There was no wilfulness about the matter at all. They were in an extremely difficult position, owing to the war, for it entirely altered the normal state of things. The question arose whether it could be said that the Corporation caused "the liquid to flow into the beck." The new tank was completed on July 3; and since then there had been no reason for complaint.

Mr. *J. B. Fenwick*, the Manager of the gas-works, bore out the statement as to the difficulty experienced with regard to the disposal of crude tar and ammoniacal liquor. At the beginning of March, he said, he told the Committee something must be done to increase the storage. The work of constructing a new tank of double the capacity of the existing one was immediately begun, and the tank was brought into use on July 3—the old tank being emptied. The gas tar and ammoniacal liquor might have flowed into the beck. It was impossible to see it get into the beck.

After an absence of nearly half-an-hour, the CHAIRMAN announced that the Magistrates had decided to convict. The Corporation were fined £5, and ordered to pay £25 towards the costs of the prosecution.

AFFAIRS OF THE TICEHURST AND DISTRICT WATER AND GAS COMPANY.

On Tuesday last, the further consideration of a debenture holders' action relating to the above-named Company came before Mr. Justice EVE in the Chancery Division of the High Court.

Mr. MARTEN explained that the undertaking had been sold with the approval of the Court, and the sanction of an Act of Parliament; and the object of the present action was to distribute the proceeds. The money realized by the sale (£9557) had been brought into Court; but it was not sufficient to pay the principal due on the debentures—£10,400 and £2000 for arrears of interest. A Receiver had been appointed of the net earnings of the concern; but there were none, and at the date of the appointment £6000 was due to trade creditors. The Receiver had managed the property with great skill; and his efforts had been most successful. When the Receiver was appointed, it was found that two statutory districts had been assigned by the Directors to another Company which they had promoted—the result being that the Company were under obligation to supply water at 6d. per 1000 gallons, whereas it cost them 9½d. Actions were brought by the Receiver in order to get rid of these agreements; and they had been successful. It was now asked that the costs incurred should be included in the charges payable to the Receiver. The remuneration payable to him had been fixed by the Master at £600.

His LORDSHIP ordered the costs of the plaintiff, and of the Receiver, to be taxed as between solicitor and client and paid out of the assets—including the costs of realization and the costs of the two actions.

As interest on the debentures was payable in priority to capital, it was arranged that the interest should be levelled-up to February, 1912, the date when the last payment was made, and that the balance should then be divided rateably.

UNSUCCESSFUL WORKMAN'S COMPENSATION CLAIM.

Action against the Wandsworth Gas Company.

At the Wandsworth County Court, on Monday of last week, before Judge Harington and the Medical Assessor, an application was made by Phillip C. Paulizki against the Wandsworth, Wimbledon, and Epsom Gas Company, under the Workmen's Compensation Act, to review and increase a weekly payment ordered to be made on a former occasion.

Mr. HANNE appeared for the applicant; Mr. SHAKESPEARE (instructed by Messrs. Sloper, Potter, and Gosden) represented the Gas Company.

Mr. HANNE stated that the claim was originally before the Judge in April, 1913. It appeared from the evidence that the applicant was employed by the Company, and was struck by an iron bar, and knocked down senseless. There was, he believed, some concussion; and the man was removed to the Bolingbroke Hospital. For the time being, the Company paid him compensation at the rate of 16s. a week. When the case came before the Judge, medical evidence was taken, and a nominal award was made of 1d. a week, which had been continued up to now. Some months after the award was made, there seemed to be something peculiar about applicant's manner; and eventually he was put under restraint, in Long Grove Asylum, where he was certified as suffering from delusions. Two months ago, he was discharged from the asylum and returned to Wandsworth; and immediately afterwards proceedings were taken to revive the matter with a view to increasing the amount of compensation. Applicant had never before suffered from delusions, there was no such thing as insanity in the family, and there seemed to be no reason why he should

have become insane, excepting as a result of the blow on the head. The accident, further, seemed to have dislocated some of the muscles at the back of the neck. He hoped his Honour would come to the conclusion that the man was not a "slacker," and that his present incapacity was really due to the effects of the accident of December, 1912. If the man had concussion in December, 1912, and in April, 1913, was certified as being able to work, it was possible within the next eighteen months that some complications might arise out of the concussion.

Applicant, giving evidence, stated that he was working at the furnaces when he met with the accident. Another man had a long bar of iron; and he missed the catch of the furnace-door, and the bar of iron came down and hit him (applicant) across the head. He was now always in pain on the left side of his head.

Dr. *M'Dowell* said he had examined applicant, and found that concussion might have been the result as he stated. Concussion frequently caused other things to develop. Asked whether applicant was in a condition to carry out his work as a gas-stoker, witness said he could actually do the physical work; but the man was just over the border line, and to subject him to work such as he would have to do in the gas-works, or any labouring work he would have to assist in, would be to throw him off his balance altogether. He (witness) found nothing the matter with applicant except his mental condition and the back of his neck.

Dr. *Morris Craig*, for the respondents, said he had examined applicant, and from his condition he did not think the blow he received was a severe one. Further, the history of the case, and his own observation, led him to the opinion that there was no connection at all between applicant's present condition of mind and the blow on the head.

Evidence having also been given by Dr. *Ogilvie*, of Long Grove Asylum, Epsom,

His Honour said the matter was a medical one; and so far as applicant's physical condition was concerned, there was no question as to his recovery from the effects of the blow. The only point was as to his present mental condition, and whether there was any connection between this and the accident he met with. He could only express the opinion the Medical Assessor had formed after the evidence—that there was nothing pathological to connect the applicant's mental condition with the blow. The case must therefore go to the respondents.

MISCELLANEOUS NEWS.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

In their report for the six months ended June 30 (which is to be presented at the half-yearly meeting on Friday) the Directors state that the accounts show a profit on the revenue account for the half year of £67,402. After providing for fixed charges, conveyance duty, compensation, &c., paid under the Brentford Gas Act, 1914, there remains the sum of £39,479, which, with the balance brought forward from last account, makes an amount of £116,487 available for dividends. The Directors recommend the declaration of dividends, subject to income-tax, at the rate of 5 per cent. per annum on the preference stock, £5 12s. per cent. per annum on the "A" consolidated stock, and 5½ per cent. per annum on the "B" consolidated stock. The accounts include, for the first time, the figures of the Staines and Egham and Sunbury Gas Companies; and the Directors are pleased to report that both the Companies taken over show satisfactory results. The increase in gas sold is 1·65 per cent. as compared with the corresponding half year. The total number of consumers is 116,207. The number of the Company's employees who have joined the army up to the present time is over 400. The Company issued an appeal for further capital; and the response was very satisfactory.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £226,714; from the rental of meters, stoves, and fittings, to £40,604; and from the sale of residual products, to £52,584—the total receipts being £319,952. The expenditure on manufacture of gas was £170,116; on distribution, £41,031; and on management, £9948—the total expenditure being £252,549. The balance carried to the profit and loss account is £67,402.

There were 97,169 tons of coal and 1,957,138 gallons of oil used during the half year in the production of 2,033,502,000 cubic feet of gas (including 857,468,000 cubic feet of carburetted water gas), of which 1,917,669,000 cubic feet were sold and 1,949,082,000 cubic feet were accounted for.

MUNICH CORPORATION GAS-WORKS.

The Last-Issued Report.

The report of the Munich Corporation Gas-Works for the financial year 1913 was published in the "Journal für Gasbeleuchtung" of the 3rd ult.; and from it the following particulars are taken.

The gas consumption during the year amounted to 44,961,960 cubic metres [1588 million cubic feet], which is 6·31 per cent. higher than in the previous year. The consumption was distributed as follows: For public lighting, 8·67 per cent.; for gas-engines, 0·65 per cent.; for cooking and heating, 58·25 per cent.; for lighting, 22·39 per cent.; through prepayment meters, 6·29 per cent.; works consumption, 1·30 per cent.; unaccounted-for, 2·45 per cent. The number of gas consumers increased by 6742—giving at the end of the year a total of 87,411.

Of the gas made, the Dachauer Strasse works produced 62·03 per cent.; the Kirchstein works, the rest. Only coal gas was made at the Dachauer Strasse works; but 3·78 per cent. of the gas produced at the Kirchstein works was water gas. At the time of maximum output there were eighteen settings with a total of 54 carbonizing ovens in action at the Dachauer Strasse works. The coke used as fuel in the producers at these works amounted to 14·62 per cent. by weight of the coal carbonized. At the Kirchstein works there were in use at the time of maximum output five settings with a total of fifteen carbonizing ovens and thirty-five retort-settings with a total of 305 retorts. The consumption of coke in heating the ovens and retorts at these works amounted to 14·08 per cent. by weight of the coal carbonized.

The coal carbonized came chiefly from the Saar district; the remainder being from Austrian Silesia and Upper Silesia. At the Kirchstein works water gas was produced partly by the admission of steam into the incandescent bed of coke in the carbonizing chambers, and partly in special water-gas plant. In the latter plant, blue or uncarburetted water gas was made at times and carburetted water gas at other times. The consumption of coke in the manufacture of the blue water gas averaged 52·7 lbs. per 1000 cubic feet; and there were consumed in the manufacture of 1000 cubic feet of carburetted water gas 50·3 lbs. of coke and 2 gallons of oil. The comparatively high consumption of coke was due to irregular use of the water-gas plant.

At the Kirchstein works 0·44 metric ton of benzol and 7·878 metric tons of xylol were used in the year for the prevention of naphthalene stoppages. The yield of tar amounted at the Dachauer Strasse works to 111·3 lbs., and at the Kirchstein works to 126·3 lbs. per ton of coal carbonized. The yield of ammonia per ton of coal carbonized was 4·75 lbs. at the Dachauer Strasse works, and 4·6 lbs. at the Kirchstein works. The gas supplied had an average calorific power of 568 B.Th.U. gross and 506 B.Th.U. net per cubic foot, at 60° Fahr., 30 inches, and saturated. Its specific gravity averaged ·488. The spent oxide sold contained on the average 10·21 per cent. of Prussian blue.

BLACKBURN CORPORATION GAS-WORKS.

Report by the Engineer and General Manager.

Mr. A. Morton Fyffe, the recently appointed Engineer and General Manager of the Blackburn Corporation Gas-Works, has prepared a report for the Gas Committee, in which he sets forth the present position of the undertaking, and steps which should be immediately taken to improve the condition of affairs.

He deals with the matter from five aspects. The first is that, even with a comparatively high price charged for gas, the department has recently failed to meet its obligations financially. As to this, he merely points out that at March, 1913, there was a reserve fund of £21,022, which has not only been entirely wiped out, but debited with a loss of £3325 carried forward into the current year.

The second point is that all the works are so altogether inefficient and in such bad repair that large sums of money will be required to bring the plant and machinery into even normal working condition. He remarks that the present state of the works can only be characterized as precarious, and is being dealt with now in order that they will be capable of meeting the demands of the coming winter, though it is impossible to say with certainty that an adequate or satisfactory supply of gas can be assured throughout next winter. A summary is given of repairs and renewals at the Greenbank works; the estimated cost being £3200, including £2000 for repairs to the retort-bench. The works at Addison Street, with the exception of the carburetted water-gas plant, which is in a bad condition, are in very much better order than the Greenbank works, and with a general overhaul can be put in fair working condition.

On the third aspect of the matter—that the unprecedented advance in prices of all raw materials for the manufacture and distribution of gas and bye-products renders it necessary that the price of gas should be immediately increased—Mr. Morton Fyffe says that, in order to prove the necessity of an advance in the price of gas, a statement is given showing the additional cost of carrying on the Gas Department during the current year, as compared with the last financial year:—

Extra cost of coal		£9,000	
Do.	gas oil	3,000	
Do.	repairs	2,000	
Do.	soldiers' dependants	1,150	
Do.	sulphuric acid	875	
Do.	wages and carting	850	
Do.	all materials such as lead pipes, iron pipes, gas-fittings, oils, stores, &c.	2,200	
			£19,075
Plus—			
Less revenue from tar		£1,400	
Do.	gas	2,000	
			3,400
	Gross extra cost		£22,475
Minus—			
Increased revenue from coke		£3,500	
Do.	sulphate	460	
			3,960
			£18,515
Plus—			
Net loss on last year's working			6,618
Estimated total loss on current year's working under present conditions			£25,133

An increase of 1d. per 1000 cubic feet in the price of gas from the commencement of next quarter to the end of the financial year is estimated to result in an increased revenue of £1745. He recommends that the price be raised 7d. per 1000 cubic feet, which would make the price 3s. 4d., less discount, or 3s. 2d. net. This increase of 7d. would mean that the slot-meters would not require to be altered, but simply that the present discount of 7d. would not be given. The total estimated increased revenue by this advance of 7d. during the last two quarters of the financial year would be £12,215. This would still show an apparent loss of £12,918 on the year, part of which it is hoped

will be saved by economy in working; and the balance of the loss could be carried forward to the next year, in the hope that a return of normal times in the country would enable the department to retrieve its position.

Next it is pointed out that, as at the present time the introduction of modern plant is impossible, the undertaking must be conducted with the greatest efficiency and economy practicable under the existing conditions. This, the report says, is the problem of the moment. At present there is practically no organization in the department; and it is when the working results come to be considered that the lack of supervision and organization shows its effect. As an instance, it is remarked that the sulphate of ammonia made during the last financial year works out at 16·16 lbs. per ton of coal carbonized; whereas the average in Lancashire is about 24 lbs.—a difference which would be worth about £2000 per annum to the Department. As to carbonizing costs, Mr. Morton Fyffe says: At the Greenbank works during May, ten out of 21 beds of retorts were at work; and the cost of carbonizing was 2s. per ton of coal, which is much too high, although partly accounted for by the deplorable condition of the retorts, mains, ascension-pipes, conveyors, &c. At the present time, the Greenbank-works being closed-down for repairs, all the gas required is being made at the Addison Street works, where six beds of retorts are at work along with the carburetted water-gas plant. These six beds of retorts are carbonizing 80 tons of coal per day, or 560 tons per week; and as 37 men per day are employed on this work, the cost of carbonizing a ton of coal is 2s. 11d. This is the retort-house in which modern electrical stoking and discharging machinery was installed ten years ago; and to-day the working costs are more than they would be if all the work was done by hand. When it is considered that the 80 tons of coal used per day is placed into the retorts and ejected therefrom by machines, and also the coke coming out to be dealt with is only about two-thirds of the weight of the coal—say, a daily total of 53 tons of coke—it is seen that on the average each man has to deal with only 29 cwt. of coke during his eight-hour shift. Considered from any standpoint, this cannot be justified; and the position must be faced and remedied. The wages of these men average 41s. 10½d. per week of 56 hours.

Another serious fact, he continues, is the declining consumption, which, if allowed to go on, will render the financial position of the department more precarious than ever. Owing to the station-meter having been out of order, it is impossible to say how much gas was made from April to June, and consequently impossible to tell what the consumption has been; but there is good reason to believe that the consumption has decreased to a much greater extent than can be ascribed to the diminution of public lighting. During the past few weeks, since the meters have been repaired and tested, it has been found that the decrease in consumption as compared with the same time last year is about 8 per cent. This is an indication of the necessity for the adoption of commercialism, because the only way to neutralize the effect of the heavy capital charges is to increase the consumption of gas; and in this connection it should be remembered that the increase of consumption from existing consumers is much more profitable than increased consumption from new consumers, desirable though the latter is. For instance, one gas-fire will generally bring a consumption of 10,000 cubic feet per annum; and when every gas consumer in Blackburn uses 10,000 feet more gas per annum, the problem of the Gas Department will be largely solved, and the anxiety of those responsible for the undertaking greatly minimized. In order to show that an increased consumption of 10,000 cubic feet per consumer per annum is quite attainable with time and work, the average consumption per consumer in various towns having municipal gas undertakings is given.

Southport	32,194	cubic feet per consumer per annum.
Manchester	31,084	,, ,, ,,
Oldham	30,056	,, ,, ,,
Bradford	28,992	,, ,, ,,
Nottingham	27,645	,, ,, ,,
Nelson	27,354	,, ,, ,,
Burnley	27,119	,, ,, ,,
St. Helens	27,076	,, ,, ,,
Halifax	26,422	,, ,, ,,
Stockport	25,873	,, ,, ,,
Leeds	22,836	,, ,, ,,
Salford	22,554	,, ,, ,,
Bolton	20,830	,, ,, ,,
Blackburn	18,668	,, ,, ,,

These figures will, it is added, also be of use to the Committee in considering the advisability of becoming subscribers to the British Commercial Gas Association.

The fifth and final aspect is that before modern plant can be installed, a very large capital expenditure will be involved; and as the capital of the undertaking is already double what it should be, it is necessary that all future capital expenditure should be of such a nature as to be self remunerative. On this head, the General Manager says that there can be no doubt that, under the present arrangement of the works, the Blackburn Gas Department can never be made a success; and there must be some drastic changes throughout the department, which will involve considerable capital expenditure. But the care necessary in dealing with future capital expenditure is best shown by the appended tabulation of the capital of the Blackburn undertaking as compared with that of other corporation undertakings.

There can be no doubt of the advisability of transferring all the manufacturing to the Greenbank works; while Addison Street would be the gasholder station, with meter, stove, and fitting workshops. Attention would thus be concentrated on the Greenbank works, where a large installation of vertical retorts should be proceeded with at the earliest possible date, as there can be no doubt that the retort-bench at the Greenbank works will now never be satisfactory after the treatment it has received, while vertical retorts are desirable for every possible reason.

There is no difficulty, so far as ground space is concerned, in transferring all the manufacturing to Greenbank, as the department owns 49 acres of land there, which is far in excess of what Blackburn will ever require for gas-works purposes. At the present time, the maximum output of gas is about 4,000,000 cubic feet per day; and at one of the Manchester gas-works, having an area of 8 acres, the producing capacity is 6,500,000 cubic feet per day, while at another works in Manchester the area is 7 acres and the producing capacity is 7,500,000 cubic feet per day.

Town.	Gross Capital of Undertaking. £	Capital Charges. Amount per Annum. £	Capital Charges. Amount per 1000 Cubic Feet of Gas. d.
Birmingham	2,581,947	120,836	3·08
Bolton	800,062	27,600	6·23
Bradford	1,212,407	54,991	6·29
Bury	338,851	14,736	8·45
Carlisle	149,777	3,422	2·42
Colne	125,894	6,066	8·51
Darlington	209,023	7,023	4·49
Darwen	224,001	8,878	9·85
Doncaster	145,522	4,630	3·53
Halifax	651,334	26,292	7·58
Keighley	148,539	6,988	4·62
Leeds	1,910,778	42,917	3·96
Leicester	1,395,339	58,367	6·44
Lincoln	241,757	7,647	4·91
Manchester	3,005,825	102,436	4·26
Nelson	237,145	14,708	8·76
Nottingham	1,186,064	53,990	5·75
Oldham	726,650	28,172	4·41
Rotherham	212,455	9,588	7·47
Salford	980,965	35,047	5·07
Smethwick	232,057	10,980	4·80
Southport	307,003	13,744	5·92
Stafford	113,156	2,729	2·76
Stockport	515,323	19,543	5·50
Wallasey	340,491	17,338	6·36
West Bromwich	256,000	8,955	5·86
Widnes	176,802	4,569	2·36
Wigan	398,783	18,423	9·26
Blackburn	790,903	32,838	11·31

LIGHTING ARRANGEMENTS AT WESTMINSTER.

The contract under which the Gas Light and Coke Company supply the public lamps in various parts of the City of Westminster will expire in November next; and the Works Committee of the City Council have had under consideration the arrangements to be made consequent thereon. The Committee think that the present is not a suitable time for inviting competitive tenders for a new contract for a term of years, as the disturbance of economic conditions caused by the war renders it difficult, if not impossible, for contractors to anticipate what might be fair prices in years to come.

For this reason negotiations have taken place with the Company with a view to a continuance of the expiring contract for a short period; and, subject to confirmation by the Council, the undermentioned arrangements have been agreed upon:

(*a*) The Company's allowances in respect of reduced lighting up to the end of the June quarter to be accepted by the Council.

(*b*) The Company to allow the sum of £1300 in respect of the reduced lighting for the period from the end of the June quarter to Nov. 15 next—any substantial modification to be the subject of mutual agreement.

(*c*) As from Nov. 15 the standard of light in all or any number of the units now employed may at the Council's option be reduced to two-thirds of the existing contract standards of minimum candle power—the Company making without charge any necessary alterations to the lamps specified by the Council to be reduced. The charges for the reduced units of light after Nov. 15 to be on a schedule submitted by the Company.

(*d*) After Nov. 15 allowances in respect of lamps left out of lighting or reduced in power beyond one-third of the present standard by order of the Government, to be calculated according to a schedule submitted by the Company.

(*e*) The Council to have the power at any time after Nov. 15 to revert to the existing contract standards of minimum candle-power in respect of the whole or any of the lamps—the payment in respect of any such lamps, and the allowances in respect of any such lamps temporarily extinguished or reduced in lighting by Government orders, to be according to schedules submitted by the Company. Any alterations of the lamps under this clause are to be made at the cost of the Company.

(*f*) The clauses of the existing contract relating to the testing of candle power and the imposition of penalties to be and remain suspended until one month after the removal of the Government restrictions in lighting.

(*g*) Save as modified, the existing condition of contract to stand.

(*h*) The arrangements above set out to continue in force until Dec. 31, 1916, or three months after the declaration of peace, whichever shall be the earlier.

The Company estimate that this arrangement will reduce the cost of public lighting after Nov. 15 by £3300 per annum, subject to modifications according to the increase or decrease in the price of gas to private consumers. This estimate presumably is dependent upon the present extent of diminution of lighting being continued. The Committee propose, however, to consider after the summer recess, in detail, the question of the general standard of reduction of light below the minimum standards provided by the expiring contract, so as to be able to ascertain more or less exactly the cost of the public gas lighting under the new arrangement, which (as above appears) is only a temporary expedient, but which, notwithstanding the great increase in the cost of gas production, they anticipate will effect a very substantial saving.

The Committee recommended that, subject to the submission of an estimate by the Finance Committee, and to their report later on the extent of light reduction to be effected, the temporary arrangement outlined by them should be adopted. This course the Council unanimously agreed to.

SCIENTIFIC AND INDUSTRIAL RESEARCH.

A Scheme for Organization and Development.

Particulars of a scheme for the organization and development of scientific and industrial research have been issued by the Board of Education, over the signature of Mr. Arthur Henderson. It will be seen from the following particulars taken from the document that the scheme provides for the establishment of a Committee as well as an Advisory Council.

There is, it is remarked, a strong consensus of opinion among persons engaged both in science and in industry that special need exists at the present time for new machinery and for additional State assistance in order to promote and organize scientific research with a view especially to its application to trade and industry. It is well known that many of our industries have since the outbreak of war suffered through our inability to produce at home certain articles and materials required in trade processes, the manufacture of which has become localized abroad, and particularly in Germany, because science has there been more thoroughly and effectively applied to the solution of scientific problems bearing on trade and industry and to the elaboration of economical and improved processes of manufacture. It is impossible to contemplate without considerable apprehension the situation which will arise at the end of the war unless our scientific resources have previously been enlarged and organized to meet it. It appears incontrovertible that if we are to advance or even maintain our industrial position, we must as a nation aim at such a development of scientific and industrial research as will place us in a position to expand and strengthen our industries, and to compete successfully with the most highly organized of our rivals. The difficulties of advancing on these lines during the war are obvious, and are not under-estimated. But we cannot hope to improvise an effective system at the moment when hostilities cease; and unless during the present period we are able to make a substantial advance, we shall certainly be unable to do what is necessary in the equally difficult period of reconstruction which will follow the war.

The present scheme is designed to establish a permanent organization for the promotion of industrial and scientific research. Is is in no way intended that it should replace or interfere with the arrangements which have been, or may be, made by the War Office or Admiralty or Ministry of Munitions to obtain scientific advice and investigation in connection with the provision of munitions of war.

The research done should be for the kingdom as a whole; and there should be complete liberty to utilize the most effective institutions and investigators available, irrespective of their location. There must, therefore, be a single fund for the assistance of research, under a single responsible body. The scheme accordingly provides for the establishment of—

(*a*) A Committee of the Privy Council responsible for the expenditure of any new moneys provided by Parliament for scientific and industrial research.

(*b*) A small Advisory Council responsible to the Committee of Council, and composed mainly of eminent scientific men and men actually engaged in industries dependent upon scientific research.

The Committee of Council will consist of the Lord President, the Chancellor of the Exchequer, the Secretary for Scotland, the President of the Board of Trade, the President of the Board of Education (who will be Vice-President of the Committee), the Chief Secretary for Ireland, together with such other Ministers and individual members of the Council as it may be thought desirable to add. The first non-official members of the Committee will be: The Right Hon. Viscount Haldane of Cloan, O.M., K.T., F.R.S., the Right Hon. Arthur H. D. Acland, and the Right Hon. Joseph A. Pease, M.P.

A great part of all research will necessarily be done in universities and colleges which are already aided by the State; and the supply and training of a sufficient number of young persons competent to undertake research can only be secured through the public system of education.

The primary functions of the Advisory Council will be to advise the Committee of Council on—

(1) Proposals for instituting specific researches.

(2) Proposals for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades.

(3) The establishment and award of Research Studentships and Fellowships.

The Advisory Council will also be available, if requested, to advise the several Education Departments as to the steps which should be taken for increasing the supply of workers competent to undertake scientific research. Arrangements will be made by which the Council will keep in close touch with all Government Departments concerned with, or interested in, scientific research, and by which the Council will have regard to the research work which is being done, or may be done, by the National Physical Laboratory.

It is essential that the Advisory Council should act in intimate co-operation with the Royal Society and the existing scientific or professional associations, societies, and institutes, as well as with the universities, technical institutions, and other institutions in which research is or can be efficiently conducted. It is proposed to ask the Royal Society and the principal scientific and professional associations, societies, and institutes to undertake the function of initiating proposals for the consideration of the Advisory Council; and a regular procedure for inviting and collecting proposals will be established. The Advisory Council will also be at liberty to receive proposals from individuals, and themselves to initiate proposals. All possible means will be used to enlist the interest, and secure the co-operation, of persons directly engaged in trade and industry.

It is contemplated that the Advisory Council will work largely through Sub-Committees reinforced by suitable experts in the particular branch of science or industry concerned. On these Sub-Committees it would be desirable, as far as possible, to enlist the services of persons actually engaged in scientific trades and manufactures dependent on science. As regards the use or profits of discoveries, the general principle on which grants will be made by the Committee of Council is that discoveries made by institutions, associations, bodies, or individuals in the course of researches aided by public money shall be made available under proper conditions for the public advantage.

It is important, in order to secure effective working, that the Advisory Council should be a small body; but it is recognized that, even if full use is made by the Council of its power to work through reinforced Sub-Committees, its membership may be found to be inadequate to do justice to all the branches of industry in which proposals for research may be made, or to the requests of other Government Departments for assistance. It is therefore probable that it will be found necessary to strengthen the Council by appointing additional members. The first Members of the Council will be: The Right Hon. Lord Rayleigh, O.M., F.R.S., LL.D., Mr. G. T. Beilby, F.R.S., LL.D., Mr. W. Duddell, F.R.S., Prof. B. Hopkinson, F.R.S., Prof. J. A. M'Clelland, F.R.S., Prof. R. Meldola, F.R.S., Mr. R. Threlfall, F.R.S., with Sir William S. M'Cormick, LL.D., as Administrative Chairman.

The Advisory Council will proceed to frame a scheme or programme for their own guidance in recommending proposals for research and for the guidance of the Committee of Council in allocating such State funds as may be available. This scheme will naturally be designed to operate over some years in advance; and in framing it the Council must necessarily have due regard to the relative urgency of the problems requiring solution, the supply of trained researchers available for particular pieces of research and the material facilities in the form of laboratories and equipment which are available, or can be provided, for specific researches. Such a scheme will naturally be elastic and will require modification from year to year. But it is obviously undesirable that the Council should live "from hand to mouth" or work on the principle of "first come first served;" and the recommendations (which for the purpose of estimating they will have to make annually to the Committee of Council) should represent progressive instalments of a considered programme and policy. A large part of their work will be that of examining, selecting, combining, and co-ordinating, rather than originating. One of their chief functions will be the prevention of overlapping between institutions or individuals engaged in research. They will, on the other hand, be at liberty to initiate proposals, and to institute inquiries preliminary to preparing or eliciting proposals, for useful research; and in this way they may help to concentrate on problems requiring solution the interest of all persons concerned in the development of all branches of scientific industry.

SEVILLE WATER-WORKS COMPANY, LIMITED.

The Annual Meeting of this Company was held last Wednesday at the London Offices—the Chairman (Mr. Cowley Lambert) presiding. The report of the Directors announced that the income for the year ended March last amounted to £46,366. After deducting working expenses, the cost of laying on services and interest on debentures, the net profit was £11,286, as compared with £10,694 in the previous year. Adding to this the unappropriated profit of £6647, the amount standing to the credit of profit and loss account was £17,929. The Board deeply regretted the unavoidable delay in carrying out the new works for the filtered river water supply. This was caused by the financial position created by the war, and by the refusal of the Treasury to sanction the raising of further capital in this country for the purposes of the Company. The Board were not yet in a position to speak with regard to the success or otherwise of their endeavours to raise the necessary funds in Seville for the prosecution of the works. The application lists were being kept open; and the Manager (Mr. John I. Bithell) was not without hope of securing financial support there. The Board were anxious to do all in their power to carry out the contract with the Municipality; and with this object in view, they had already expended considerable sums of money out of revenue. They considered it advisable to continue this policy; and, in view of this, notwithstanding the fact that the Company had earned a net profit of £11,286, they refrained from recommending the payment of any dividend at the present time. The Chairman, in moving the adoption of the report and accounts, noted the substantial increase in water-rentals, and made a strong appeal to the people of Seville, in view of the capital restriction powers in this country due to the war, to provide the capital for carrying out the new water scheme, in connection with which the pipe-laying work has been commenced. Mr. F. S. Jackson seconded the motion; and it was unanimously carried. It was explained by the Chairman, in reply to questions, that the money that was being spent on the scheme out of revenue and the carry-forward would be replaced out of capital when raised.

Increased Price leads to Reduced Lighting at Kidderminster.—At last Wednesday's meeting of the Kidderminster Town Council, the General Purposes Committee reported that, as the tender of the Gas Company to light the public lamps for a year was 62s. per lamp, an increase of 10s. a lamp, the Committee proposed to reduce the number of lamps by about 130. Alderman Johnson regarded the charge as a very "exorbitant one," and not justified by the circumstances. Major Talbot said the wages at the gas-works had increased 42 per cent., and the price of coal 50 per cent. The Gas Company had made every possible concession to the Corporation. The Mayor hoped the Committee would have plenty of courage, and not be afraid of reducing the lighting. People in London and elsewhere soon got used to less light; and there had been no increase in accidents or crime. He did not think the reduction of 130 lamps was enough. The Committee were therefore asked to consider the matter further and report later on to the Council.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Important installations of new plant are in progress at the Forfar, Cupar, and Ayr Gas-Works. The Woodall-Duckham Vertical Retort and Oven Construction Company, Limited, are supplying the retorts. At Forfar, the contract consists of one bench of ten retorts, capable of dealing with 40 tons of coal per day of 24 hours, supplied complete with a steel-framed retort-house, and all coal and coke handling machinery. The equipment also includes a coal-breaker, a cased-in bucket elevator, and a push-plate conveyor and lift. In ordinary working, all the coal taken to the overhead storage hoppers above the bench (which will be of 48 hours' capacity) is raised by the bucket elevator and push-plate conveyor; but the lift will be so arranged that it can be used for elevating coal in case of a breakdown to the conveying plant. At the Cupar Gas-Works, one bench of six retorts is in course of erection, capable of dealing with 22½ tons of coal per 24 hours. It will be complete with a steel-framed retort-house and lift for coal and coke handling purposes. The new installation at Ayr by the firm named is now at work, and comprises one bench containing four settings, each of two retorts, together capable of carbonizing 40 tons of coal per 24 hours. It is complete with a steel-framed retort-house and lift for coal and coke handling purposes. This installation is specially arranged for future extensions to be carried out when coal and coke handling machinery can be installed.

The contracts clause in the Price of Coal (Limitation) Bill will bring about a saving to the Gas and Electricity Departments of the Corporation of Glasgow of between £50,000 and £60,000. The Gas Department bought 800,000 tons of coal at an increase of 5s. 3d. per ton over last year's prices; and the Electricity Department 170,000 tons at an increase of 6s. 3d. per ton.

The annual meeting of the Bo'ness Gaslight Company, Limited, was held on Monday—ex-Provost Ballantine presiding. The balance-sheet showed a profit of £907, compared with £720 the previous year; and the disposable balance at the credit of profit and loss was £1666, from which a dividend of 6 per cent. free of income-tax was declared—absorbing £847. The report of the Manager (Mr. James Campbell) showed that the gas made was 34,677,000 cubic feet—an increase of 2,465,000 cubic feet (7·55 per cent.)—while the sales increased by 3,515,800 cubic feet, the leakage having been reduced from 13·37 to 9·93 per cent. The gas made per ton of coal amounted to 10,220 cubic feet; and there were sold 8·01 cwt. of coke, and 46·48 gallons of tar and ammoniacal liquor per ton of coal carbonized. The receipts from residuals were equal to 55 83 per cent. of the cost of the coal.

The Brechin Gas Company are paying a dividend of 18s. per share. The Brechin works are connected-up with Edzell, the inhabitants of which golfing resort are now obtaining a supply of gas at a much lower price than they had been accustomed to pay. In this district of Forfarshire, the increases per 1000 cubic feet in the price of gas this year are as follows: Brechin, 4½d.; Forfar, 6d.; Dundee, 7d.; Arbroath, 10d.; Monifieth, 10d.; Carnoustie, 6d.

At this week's meeting of the Glasgow Corporation, the Magistrates had before them a letter from the Secretary of the Glasgow and West of Scotland Armaments Committee enclosing a copy of a letter addressed by the Committee to the Manager of the Smoke Abatement Exhibition, which is to be held in Glasgow in the autumn, and to which the Corporation have granted their patronage, suggesting that representations should be made to the promoters of the exhibition as to the desirability, in the circumstances, of postponing the holding of the exhibition. The Magistrates agreed to make no pronouncement on the subject.

The report for the year ended May 31, which was submitted at a meeting of the Finance Sub-Committee of the Glasgow Electricity Committee last Wednesday, stated that the revenue account continues to show favourable results; an increase of income from all sources of £27,057, despite the abnormal conditions prevailing, being regarded as most gratifying. Contracts have been entered into for the supply of coal for the current year at prices very considerably in advance of those of last year. Having in view this serious increase in working costs, and increased amounts payable for interest, sinking fund, and rates and taxes, and a general advance in the cost of all materials required during the coming year, the Sub-Committee agreed to recommend that rather than alter the existing scale of charges, 15 per cent. be added to all accounts from the date of the last survey. The charges for current for the year 1915-16 will therefore be the same as last year, *plus* the 15 per cent.

Gas and Air Appliances Company, Limited.—A Leicester Company bearing this title was registered last week, with a capital of £5000, in £1 shares.

Leatherhead Gas and Lighting Company.—The Directors' report for the year ended June 30 states that the receipts amounted to £18,865, and the working expenses to £14,659, leaving a profit of £4207, to which is added £1759 brought from the previous year—making a total of £5966. Deducting interest on loans and debenture stock, income-tax, and the interim dividend paid in February (£2491 in all) there is a balance of £3474 now available for division among the shareholders. The Directors recommend the payment of a further dividend, making 5 per cent. for the year—absorbing £1528, and leaving £1945 to be carried forward. The sale of gas advanced from 64 to 71 million cubic feet—an increase at the rate of about 10 per cent. The Company's Consulting Engineer (Mr. F. S. Cripps, Assoc.M.Inst.C.E.) reports that the apparatus at the gas-works has been maintained in an efficient condition. Two new settings of retorts have been erected, and other necessary renewals and repairs carried out. The supply of gas through the high-pressure main has proved satisfactory. The increase in the demand for gas necessitated the laying of some larger mains; and about 500 yards of 8-inch and 1000 yards of 6-inch mains have already been laid. An 8-inch main is in progress along the Byfleet Road to replace the 5-inch main sold to the Walton and Weybridge Gas Company. About 400 yards of 3-inch and 4-inch mains have been laid.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 30.

The prices of tar products in the London market as recorded last week remain practically unchanged. Pitch is 26s. per ton in bulk, with a fair inquiry. Creosote remains at 4½d. per gallon net in bulk. There is a very good demand for solvent naphtha, and the price is firm at 2s. to 2s. 3d. per gallon.

Sulphate of ammonia is unchanged at £14 8s. 9d. per ton net, into buyers' bags at makers' works, for 25 per cent. minimum quality.

Tar Products in the Provinces.

July 31.

The markets for tar products still remain fairly steady. There is practically no business doing in pitch, owing to the uncertainty in freights and buyers' ideas being somewhat lower than those on this side. Solvent and heavy naphthas continue in good demand. Creosote is quiet, and very little business is reported.

The average values of gas-works products during the past week were: Gas-works coal tar, 21s. 6d. to 25s. 6d. Pitch, East Coast, 22s. to 23s. per ton; Norfolk, Suffolk, and Humber ports, 19s. to 20s.; West Coast, 20s. to 21s. Manchester; 21s. to 21s. 6d. Liverpool; 23s. to 24s. Clyde. Benzol, 90 per cent., naked, North, 11d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 10d. to 1s. 11d. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3d. to 3 1/16d. Heavy oils, in bulk, 3⅛d. to 4d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 3s. 6d. Naphthalene, £8 to £16; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *July* 30.

Owing to the Government refusing to issue further licences for the export of this material to certain destinations until they have made inquiries, the market has been inactive throughout the week, but no quotable change has taken place in prices. The nearest values to-day are still £14 13s. 9d. f.o b. Hull, £14 16s. 6d. f.o.b. Liverpool, and £15 1s. 3d. per ton f.o.b. Leith. The dulness in the near position has tended to deter buyers from operating for future delivery, but makers have continued firm in their views at £15 2s. 6d. to £15 5s. per ton at the principal ports for October-March shipment.

Nitrate of Soda.

During the past week this market has remained quiet but steady at 12s. 3d. per cwt. for ordinary, and 12s. 6d. for refined quality on spot.

Sulphate of Ammonia.

From another source it is reported that there is no change in this article. Sales have been very quiet during the past week. Outside London, makes are quoted at £13 15s.; Hull, £14 15s.; Liverpool, £14 17s. 6d.; Leith, £15; Middlesbrough, £14 15s.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade in the north-east is rather firmer, and there is a better inquiry for some classes of fuel, so that, with the limitation of the output by the holiday, prices seem stiffer. In the steam coal trade, the producers have fairly full order books; and for early delivery there is a strong demand. Best Northumbrian steams are from 21s. to 21s. 6d. per ton f.o.b.; and for second-class steams the current price is about 16s. 6d. per ton. For steam smalls, the price varies from 13s. to 15s. per ton. The latter class seem more in request; and the tendency of prices is on the whole firmer, though the output appears to be now fully an average one. There is a good demand for this season of the year for gas coals, and the production is readily taken up, though the home consumption is naturally slow just now. Best Durham gas coals are from 20s. 6d. per ton f.o.b.; and for second-class gas coals about 17s. per ton is the current quotation. For "Wear Specials," 21s. per ton f.o.b. is the usual price at present. The freight rate is quiet, with gas coal from Tyne to London at about 7s. to 7s. 1½d. Little is doing in contracting at the present time. It is not thought that the Price of Coal (Limitation) Act will have much actual influence on gas coal contracts, but it may slightly relax forward prices. Coke is generally firm. For good gas coke, the quotation is from 26s. to 27s. per ton f.o.b.—figures relatively high to those for furnace coke.

Manchester Electrical Undertaking.—Notice has been given by Councillor Clyne that he will move the following resolution at to-morrow's meeting of the Manchester City Council: "That a Special Committee of members of the Council, other than members of the Electricity Committee, be forthwith appointed for the purpose of making inquiry into the working and control of the Corporation electrical department; and that an independent expert in electricity, who is associated with the control of some large electrical concern run on business lines, be engaged by such Special Committee to advise. That they be empowered to hear the views of citizens who may be either favourable or unfavourable to the present and (or) prospective policy of the Electricity Committee; and that they shall report to the City Council as to the necessity or otherwise, in their judgment, of certain proposals being forthwith proceeded with or postponed until after the present period of national financial strain."

Gas Profits and the Rates at Smethwick.

At a meeting of the Smethwick Town Council last Tuesday, a resolution was moved by Mr. Morris to the effect that in future the annual contribution out of gas profits in aid of the rates be discontinued, and that in lieu of this the Gas Committee undertake free of charge to the Council the whole of the public lighting in the borough, including all expenses connected with lighting and maintaining the public lamps. The resolution was discussed at length, but was ultimately rejected by a large majority. The Chairman of the Gas Committee (Alderman Goodyear) said an application had been received for a supply of gas on a very large scale for manufacturing purposes; and along with it, they had been asked to reconsider the price. They anticipated that this would mean an output of about 6 million cubic feet per quarter; and he proposed that the scale of charges be extended so as to include an additional rate of 1s. 7d. per 1000 cubic feet for quantities of 4 million cubic feet per quarter and upwards. This was agreed to.

Bahia Blanca Gas Company, Limited.

Moving the adoption of the report and accounts at the annual meeting of the Company last Thursday, the Chairman (Mr. J. C. im Thurn) said the result of the year's working, after meeting interest on loans, was a debit balance of £2294. The expenditure side of the revenue account had been reduced by no less than £1920; but this was offset by the decrease in receipts—chiefly under the heading of sales of gas. The Manager (Mr. A. M. Hunter) said his staff had done good work under most depressing and trying conditions. The cordial relations maintained with the municipal authorities, and the satisfaction customers expressed at the manner in which they were served, were entirely due to the vigilance and attention of the officers. The City of Bahia Blanca was an exporting port for the grain crops of the southern part of the Argentine Republic; and if these failed, the business of the town came to a standstill. This unfortunately had been the case for the past four or five years; and accordingly the town had suffered in a manner that could scarcely be understood in England. In consequence of the sudden prohibition of coal exports from this country, the Board had to make the best arrangements possible in order to keep the works going. Stocks were sufficient to last until about February next, which, all things considered, was very satisfactory. The high price would certainly still further handicap the Company; but this was unavoidable. It appeared certain that some method of reconstruction would be the best way of placing the Company upon a more satisfactory basis. Reports from Mr. Hunter dealing with the prospects for the immediate future were of an encouraging character; and if, as he was sure they all hoped, the coming harvest was a good one, he trusted the town would at last begin to recover. The report was adopted; and a hearty vote of thanks was passed to the Chairman, Directors, and staff.

Gas Price at Lurgan.—The Lurgan Gaslight and Chemical Company, Limited, have raised the price of gas from 3s. 10d. to 4s. 2d. per 1000 cubic feet.

Malvern Municipal Undertakings.—Reporting on the financial operations of the reproductive undertakings of the Malvern Urban District Council during the past twelve months, Mr. Edward Stevens (the District Auditor) says that on the gas undertaking, the year's trading showed a loss of £165, as compared with a profit of £1619 in the previous year; and the loss on the water undertaking was £3066, as compared with a loss of £1807. In both cases this was mainly due to a falling off in receipts. It was to be noted, in regard to the gas undertaking, that the increased arrears of rentals, &c., amounted to no less than £970; so that the position would have been very different had the collection been as good as it was last year. The electricity undertaking showed a profit of £824, as compared with one of £317 in the preceding year.

Instruction in Munition Making at Cardiff.—The members of the Cardiff City Council were informed at their meeting last Wednesday that, by the kindness of the Gas Company, through the Secretary and General Manager, Mr. George Clarry (who is also a member of the Technical Education Committee), valuable facilities had been offered to afford instruction in munition making. The Company had given premises free of rent and charges, with plant, &c.; but it would be necessary to appoint an instructor. There were, it was stated, some 500 engineering apprentices in the schools of the Committee, who, with a little training, could be turned into useful workers. The local Munitions Committee had expressed their delight at the proposal; and the Council were asked to sanction expenditure not exceeding £250. The Board of Education would give grants which would help materially; and they had issued an urgent circular on the subject. The expenditure was agreed to.

Price of Gas Advanced at Hebden Bridge.—At a meeting of the Hebden Bridge and Mytholmroyd Gas Board last Thursday, the question of increasing the price of gas was given full consideration. There was a recommendation from the Works Committee that the price should be increased 3d. per 1000 cubic feet. After this had been proposed, Mr. Grindrod asked if an increase of 3d. would be sufficient to meet the increased cost of production. He said he learned that the Board had at the present time a debit balance at the bank. The Chairman (Mr. Charles Robertshaw) replied that the Committee had not considered the question of raising the price further when the coal advances came into operation. It was necessary to raise the cost to meet the present increased price of coal and also the extra sinking fund on the money spent during the last few years. The Committee were unanimous in fixing the increase at 3d. They made the move well knowing that most Boards in the country had increased the price 6d. per 1000 cubic feet. The recommendation was confirmed; and the price of gas after September will be 3s. 3d. per 1000 cubic feet.

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Street Lamp-Posts.

Referring to possibilities in connection with street lamp-posts, the "Sanitary Record" says: The ordinary street lamp-post is not exactly a thing of beauty, although from a utilitarian point of view it may be a joy; but there is no reason why it should not be utilized to a wider extent than is at present the case, and for purposes other than that of merely illuminating roads and pavements. It is true that something in this direction has already been done. In many parts of London and in provincial towns and cities, the lamp-post not only indicates the name of the street, but points the way to the nearest cab-stand, tramway starting-point, fire-station, railway station, or other building. It is also made to serve the purpose of an indicator to direct the wavering wayfarer to some place of worship, or else to the nearest convenient public bath and wash-house—the ultimate aim in each case being the acquirement of purity in some shape or form. There is really no reason why the capabilities of the lamp-post as a useful public servant should stop here. Lamps at prominent crossing-places, at the beginning and in the middle of leading thoroughfares, might quite well be equipped with a metal tablet displaying in bold characters the nearest police station, doctor, post, telegraph, and telephone office, ambulance station, fire hydrant, and even the position of the nearest policeman on point duty. Where electricity is employed, this information might be inscribed on a glass panel and illuminated at night with but little extra cost. The suggestion is so simple and obvious that it is surprising it has not been generally adopted; but it has ever been the rule that the simpler the innovation, the less likely it is to come into general utility. It certainly seems so in this case.

Price of Gas at West Bromwich.—In consequence of the increase in the cost of material, &c., the price of gas of the West Bromwich gas undertaking has been advanced 6d. per 1000 cubic feet as from the June accounts.

London County Council Gas Examiners.—In a report adopted by the London County Council at their meeting last Tuesday, the Public Control Committee stated that the change in the duties of some of the gas examiners, consequent upon the abolition of penalty illuminating power tests in the case of the Gas Light and Coke Company, rendered it necessary to reconsider the approved scheme for the appointment of examiners. After full consideration, they were of opinion that part-time examiners only should be employed; and they had accordingly framed proposals intended to lead to the ultimate formation of a pane of gas examiners of whom a sufficient number would be employed from time to time at daily rates of pay—"thus furnishing an adequate number of experts for use in every contingency, and ensuring sufficient control over the avoidance of undue risk of error in gas examiners' reports." The recommendations adopted by the Council, included one that the remuneration for duty in the area of the Gas Light and Coke Company should be 10s. a day, and at other stations 10s. 6d.

Battersea Bridge Damaged.—The L.C.C. Highways Committee have reported that on the 2nd ult., the s.s. "Wandle," belonging to the Wandsworth, Wimbledon, and Epsom District Gas Company, ran into an arch of Battersea bridge, rendering useless two outside ribs of the arch on down-stream side, and breaking a large quantity of ornamental cast-metal face work. Road traffic on one side of the bridge had to be immediately stopped; and this course involved the suspension of the tramway traffic on one line of rails. They suggested that an estimate of £1000 should be approved in respect of the cost of repairs to be carried out during the summer recess. This was a provisional amount, pending the ascertainment of the actual cost of making good the damage to the bridge.

Aldershot Gas, Water, and District Lighting Company.—In the report to be presented at the half-yearly meeting next Friday, the Directors state that the total revenue for the six months to June 30 was £51,456, and the expenditure £39,785, leaving a surplus of £11,671. After providing for the preference dividend and interest charges, the Board recommend payment of the full statutory dividends on the "A," "B," and "C" stocks. The sale of gas for all purposes has increased 26·89 per cent.; and the sale of water has also advanced. The output of electricity was 12,149 units for the first half-year's working, and the future of this department promises to be successful. Residuals have been better; but the extra price for coal neutralizes any benefit. The prospects for coal, oil, and other commodities used in the Company's various undertakings does not appear too rosy.

Maidstone Gas Company.—The ordinary yearly meeting of the Company will be held on Thursday, when the Directors will submit the report and statement of accounts for the year ended June 30. The war has entirely upset the balance of trade conditions, the report points out, and affected the Company in a variety of ways. The scarcity of tonnage, and difficulties in connection with transport, resulted in a considerable shortage in the deliveries of coal bought under contract. In order to ensure the maintenance of the supply of gas, the Directors were forced to purchase coal in the open market at considerably higher rates. This necessitated an increase in the price of gas of 3d. per 1000 cubic feet as from the readings of the meters for the March quarter. The sales of gas showed a satisfactory increase of 3 per cent. over the previous year; this result being partly due to the billeting of troops in the town during the winter months. In the early part of the financial year coke prices were below the normal; but for the last six months the conditions applying to coal gave the coke market a favourable turn. After providing for all fixed charges (including £2000 depreciation in respect of stoves and fittings, and £1831 to the renewal fund), there remains an available balance of £15,630; and the Directors recommend a dividend of 6 per cent. for the half year to June, which, with the interim dividend paid last March, makes 7 per cent. for the year. The installation of mechanical stoking machinery, it is mentioned, was completed in the autumn of last year and is working satisfactorily. The Directors record with satisfaction that thirty of the Company's employees are at present serving with the Colours.

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RADFORD ROAD, NOTTINGHAM.

Smyrna Gas-Works.—An "Evening News" telegram stated last week that bombs were dropped by Allied aëroplanes on the Smyrna Gas-Works, putting the town in darkness. The Ottoman Gas Company state that they cannot obtain confirmation of this report.

Dearer Gas at Ripon.—It has been decided by the Ripon City Council to raise the price of gas from Oct. 1 next 5d. per 1000 cubic feet—from 2s. 11d. to 3s. 4d., with discounts of 2½, 5, 7½, and 10 per cent., and that the discount for automatic consumers be reduced from 2d. to 1d. in the 1s. It was pointed out that the increase in expenditure is a very serious item. The estimated increase in the cost of coal for the ensuing year is £960, and on wages, materials, &c., £400.

Glass from Denmark.—The following reply, by Mr. P. Andresen (the London Representative of the Danish Glass Manufacturers), has been published in "The Times" to a letter in which the writer said he had never before seen a "Danish-made lamp chimney" [*ante*, p. 212]: I am happy to have the opportunity of taking up the challenge thrown down by Mr. Charles D. White with regard to the alleged German lamp chimney. If, as Mr. White says, he has lived in Denmark, I fear that he must have been most unobservant, and that his knowledge of the glass-making industries of Denmark is *nil*. Denmark can boast of many important glass factories, most of which are now amalgamated in one big company, the United Glass-Works, of Copenhagen. Another glass-works, formerly belonging to the Government, has been working for over a hundred years. With regard to the shape of the chimney, one would have thought that even a Devonshire village chandler would know that lamp chimneys must always be made precisely to one definite pattern for certain specific burners; otherwise a smoky flame would result. The ring and the words stamped on the glass are put there by special request of the buyer, in order to satisfy trade conservatism. I am entirely at the service of Mr. White, or any of your readers, to prove that important glass-works do exist in Denmark; and I should no doubt be able to tell him in which particular factory the lamp chimney was made if he would produce it to me.

Proposed Labour Board at Birmingham.—The General Purposes Committee have been directed by the Birmingham City Council to consider the appointment by the Council of a Labour Board, having authority to determine the question of wages of workmen employed by the Corporation, the conditions of their employment, and their transference from one department to another. There has for several years been in existence a Joint Committee on Labour; but in operation two obstacles have been found to the effectual working of this body. In the first place, the Committee is too large; and in the second, it has no authority to enforce its recommendations.

Loans for Expenditure already Incurred.—In giving their formal approval to the borrowing of £15,936 for electricity purposes by the York Electricity Committee, the Local Government Board write that they have decided, though not without much hesitation, to sanction loans in respect of the expenditure already incurred, or to which the Town Council are committed. The Board view with great dissatisfaction the action of the Town Council in incurring this expenditure in anticipation of sanction; and they again warn the Council to avoid this irregular procedure, "as it will not be possible for the Board to be satisfied with repeating their warning in similar cases in future."

Gas Charges at Halesowen.—The reduced lighting during last winter in the Halesowen district has, it is said, led to a dispute between the Rural Council and the Halesowen and Cradley Heath Gas Companies. In accordance with a request from the military authorities a large number of the public lights were extinguished; and the Halesowen Company have made an allowance of £85 16s. and the Cradley Heath Company one of £50 11s. in respect of these lamps. The Rural Council, having considered the particulars supplied to them by the two Companies, have declined to accept the amounts, and have requested the Halesowen Company to make an allowance of £172 and the Cradley Heath Company one of £100. If the dispute is not settled on these terms, the Council threaten to cut off the whole of the public lighting during next winter.

GAS COMPANIES IN THE STOCK EXCHANGE.

Business on the Stock Exchange last week was naturally curtailed by the closing of the House from Friday till the Tuesday after August Bank Holiday. But the brief period had exceptional interest, as the market in the new War Loan was thrown open on Thursday. This had been so much discussed and looked forward to that the result was perhaps a little disappointing. Under a couple of hundred bargains was the sum-total of transactions, and the aggregate amount of stock changing hands was comparatively inconsiderable. The price, *cum* rights, was 98½ to 99½. The general tone of the week was satisfactory. The old War Loan fluctuated at times, but gained on balance. Home and Colonial Government issues were steady. Home Rails and Americans showed some improvement, and lines connected with warlike apparatus advanced. Among these miscellaneous adventures, the Canadian Car Company had quite a sensational boom. The Government of India will invite subscriptions at par to a £3,000,000 loan at 4 per cent.—½ per cent. less than the British War Loan. Business in the Gas Market was of the quietest description, and prices showed no inclination to move. Another batch of companies' accounts for the June half year are out, and, although not all are equally gratifying, the general results go to show that, having regard to the exceptional circumstances of the period, reasonable expectations have been met. The Money Market was brisk and active, and discount rates were steady.

Bargains done for cash during the week were as follows: On Monday, Gas Light preference 71, 71½, ditto debenture 60, South Metropolitan 84. On Tuesday, Bombay 5½, Brentford debenture 80, 80½, Gas Light ordinary 80½, ditto preference 71, 71½, ditto debenture 60, 60½, 61, South Metropolitan 84. On Wednesday, Bombay 5½, Commercial debenture 60, Gas Light ordinary 80¾, 81, 81½, ditto preference 70¾, 71, ditto debenture 60½. On Thursday, European 12½, 12$\frac{9}{16}$, Gas Light ordinary 80½, 81½, ditto preference 70¾, 71, ditto debenture 60¾, South Metropolitan 83½. On Friday, Bournemouth debenture 11$\frac{3}{32}$, 11$\frac{5}{32}$, Gas Light ordinary 80¾, 81, ditto preference 71, ditto debenture 60¼, San Paulo debenture 89½, South Metropolitan 83½.

Bank rate (fixed Aug. 8, 1914), 5 per cent. Last year, the rate was raised on July 30 from 3 per cent. to 4 per cent. On July 31, it was raised to 8 per cent.; and on Aug. 1, to 10 per cent. On Aug. 6, it was lowered to 6 per cent.; and on Aug. 8, to 5 per cent., which has remained the rate ever since.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING JULY 31.

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59—64	3 18 2	..
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	£5	April 29	7½	Bombay, Ltd.	5¼—6⅜	5 17 8	5¼
50,000	10	Feb. 26	16	Bourne-mouth Gas and Water { 10 p.c.	29—30	5 6 8	..
373,480	10	,,	7	Bourne-mouth Gas and Water { B 7 p.c.	15—15½	4 10 4	..
95,000	10	,,	6	Bourne-mouth Gas and Water { Pref. 6 p.c.	13½—14	4 5 9	11$\frac{1}{32}$—11$\frac{3}{32}$
—	—	,,	—	Bourne-mouth Gas and Water { Deb.	..	—	..
880,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	5 5 3	..
880,000	,,	,,	11	Do. New	204—209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	4 6 0	80—80½
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	5 3 4	..
244,200	,,	,,	8	Do. A Ord. Stk.	154—159	5 0 8	..
530,000	£20	Mar. 26	12½	British	44—45	5 11 1	..
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½—2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	104—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	5 1 2	..
560,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	8	Do. 3 p.c. Deb. Stk.	69½—71½	4 3 11	60
800 000	Stk.	,,	4	Continental Union, Ltd.	76—79	5 1 3	..
200 000	,,	,,	7	Do. 7 p.c. Pref.	115—118	5 18 8	..
—	—	,,	—	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	Derby Con. Stk.	123—125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	£10	July 29	10	European, Ltd.	17½—18	5 11 1	12½—12$\frac{9}{16}$
16,362,910	Stk.	Feb. 12	4/17/4	Gas Light and Coke { 4 p.c. Ord.	98—102	4 15 6	80½—81½
2,600,000	,,	,,	3½	Gas Light and Coke { 3½ p.c. max.	76—79	4 8 7	..
4,062,235	,,	,,	4	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	4 0 10	77$\frac{3}{32}$—71½
4,674,850	,,	June 11	8	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	4 0 6	60—61
130,000	,,	,,	10	Gas Light and Coke { 10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	£10	April 29	11	Hongkong & China, Ltd.	16½—16¾	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7½†	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅔†	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150—160	5 12 6	..
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 6	..
561,000	Stk.	Feb. 26	10	Liverpool 5 p.c. Ord. { A	211—213	4 13 11	..
718,100	,,	,,	7	Liverpool 5 p.c. Ord. { B	146—14	4 14 7	..
306,083	,,	June 26	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	—

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
75,000	£5	June 11	6	Malta & Mediterranean	4½—4⅝	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 23	4	Monte Video, Ltd.	11½—12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'teah'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—15	5 2 8	..
300,000	Stk.	May 14	8	Oriental, Ltd.	117—122	6 11 2	..
60,000	£5	Mar. 26	10	Ottoman, Ltd.	7⅞—7¾	6 9 0	..
60,000	£50	Feb. 26	12	Portsea, Island B	128—131	4 19 8	..
100,000	£50	,,	12	Do. C	118—121	4 19 2	..
52,000	£50	,,	10	Do. D	..	—	..
249,980	£5	April 29	8	Primitiva Ord.	5½—6	6 18 4	..
499,960	£5	June 26	5	,, 5 p.c. Pref.	4¾—5	5 0 0	..
521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	San Paulo { 6 p.c. Pref.	10½—11	5 9 1	..
125,000	60	July 1	5	San Paulo { 5 p.c. Deb.	47—49	5 2 0	89½
135,000	Stk.	Mar. 12	10	Sheffield A	238—224	4 9 8	..
209,984	,,	,,	10	Do. B	222—224	4 9 8	..
523,500	,,	,,	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	South African	10½—11½	7 16 6	..
6,429,895	Stk.	Feb. 12	5/4/0	South Met., 4 p.c. Ord.	111—113	4 16 8	83½—84
1,895,445	,,	July 10	8	Do. 3 p.c. Deb.	72½—74½	4 0 6	..
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	5 8 5	..
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	4 9 8	..
—	—	,,	—	Do. West Kent.	..	—	..
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	..
629,740	Stk.	May 14	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham District { A 5 p.c.	135—138	5 8 8	..
742,275	,,	,,	6†	Tottenham District { B 3½ p.c.	115—117	5 2 7	..
181,255	,,	June 26	4	Tottenham District { 4 p.c. Deb.	87—89	4 9 11	..
189,380	£10	Dec. 30	5	Tuscan, Ltd.	5—6	8 6 8	..
149,900	£10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
30,000	Stk.	Feb. 26	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6½	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	,, C 3½ p.c.	110—115	5 2 0	..
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6½	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

Messrs. John Terry and Co. (as London Agents for the Company) have received from the Metropolitan Gas Company of Melbourne a cable advice informing them that the profits for the half year to June 30 were £104,344. A dividend of 6s. 6d. per share for the six months has been declared, a sum of £38,800 has been transferred to the reserve fund, and the balance carried forward is £36,600.

The Bradford City Treasurer (Mr. F. Ogden Whiteley), in his annual statement of accounts of the municipal trading undertakings of the city for the year ended March 31, states that the total income from all the undertakings was £1,037,537; and there was a net surplus of £39,517. The expenditure amounted to £7,592,017, of which £2,439,314 has been repaid. There is thus a net debt on the undertakings of £5,152,703.

When a proposal of the Gas Committee came before the Leeds City Council, to the effect that, in lieu of the provision of a motor-car for the General Manager (Mr. W. B. Leech), a quarterly allowance of £35 should be made to him for using his private car for official purposes, an amendment was moved that the matter be referred back. It was, however, pointed out that, in order efficiently to superintend the different gas-works, it was necessary that the Manager should visit them several times during the day and night; and the amendment was defeated by a large majority.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

SALES MANAGER. 6075.
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